



# IMMEDIATE RESPONSE ACTION PLAN

## Status Report 6

Barnstable Municipal Airport  
Hyannis, Massachusetts

RTN 4-26347

October 2019



*Prepared for:*  
**Barnstable Municipal Airport**  
480 Barnstable Road  
Hyannis, MA 02840

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# IMMEDIATE RESPONSE ACTION PLAN STATUS REPORT 6

BARNSTABLE MUNICIPAL AIRPORT  
HYANNIS, MASSACHUSETTS  
RTN 4-26347

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## 1.0 INTRODUCTION

The Horsley Witten Group, Inc. (HW) has been retained by the Barnstable Municipal Airport (the Airport) to develop this sixth Immediate Response Action (IRA) Plan Status Report for its property at 480 Barnstable Road, Hyannis, Massachusetts (Figure 1). HW has prepared this report in accordance with the Massachusetts Contingency Plan 310 CMR 40.0000 (MCP) on behalf of:

Ms. Katie Servis, Airport Manager  
Barnstable Municipal Airport  
Hyannis, Massachusetts 02601  
(508) 775-2020

The report describes IRA related activities conducted between April 2019 and October 2019 in the context of previous sample collection and analysis.

## 2.0 SUMMARY OF IRA PLAN

An IRA was initiated in response to a Notice of Responsibility (NOR) for Release Tracking Number (RTN) 4-26347 dated November 10, 2016, issued to the Airport by the Massachusetts Department of Environmental Protection (MassDEP). The NOR requested that the Airport conduct additional field investigations to evaluate sources of two types of contaminants previously detected at the Airport and on adjacent properties and to identify potential impacts to public water supply wells operated by the Hyannis Water District at the Mary Dunn and Maher wellfields.

The NOR specifically requests that the Airport investigate perfluoroalkyl substances (PFAS) including perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) previously detected in groundwater at the Airport and several adjacent properties. MassDEP also requested further evaluation of 1,4-dioxane, previously detected in a monitoring well downgradient of the Airport on the Maher wellfield property.

A proposed IRA plan was submitted for approval in response to the NOR. Subsequently, a meeting was held by MassDEP at the Airport that included other stakeholders including the Barnstable Department of Public Works, the Hyannis Water District and Barnstable County representatives (representing the Fire Training Academy). At the meeting, IRA plans were coordinated between the Airport and Fire Training Academy including sampling locations, type of analysis, groundwater modeling, goals and next steps. The IRA plan served as the guide for the soil and groundwater testing conducted since November 2016 to follow up on the results of the previous analyses.

## 2.1 Background

Prior to issuance of the NOR, the Airport had conducted investigations on both PFAS and 1,4-dioxane and provided results to MassDEP. In July 2015, HW sampled groundwater from seven wells for analysis of 1,4-dioxane. The contaminant was detected in well OW-9DD located in the Maher wellfield at a concentration of 0.93 ug/L, above the 0.30 ug/L groundwater standard for 1,4-dioxane. This well is screened from 77 to 87 feet below the ground surface. Samples taken from wells on Airport property did not contain 1,4-dioxane above laboratory reporting levels.

A potential source of 1,4-dioxane at the Airport is a historic release of 1,1,1-trichloroethane (1,1,1-TCA) from an oil/water separator associated with a floor drain in the former Provincetown Boston Airlines hangar (currently leased to Cape Air). Given the screen depth of monitoring well OW-9DD, the 1,4-dioxane may also be from an off-Airport source.

On August 4, 2016, MassDEP issued a Request for Information (RFI) to the Airport requiring investigation of PFAS. On July 1 and 5, 2016, HW collected samples from six monitoring wells and submitted samples for laboratory analysis for the presence of PFOS and PFOA. These compounds were detected in each of the wells tested. At monitoring wells HW-3 and HW-5, the sum of PFOS and PFOA concentrations were 0.084 and 0.12 ug/L respectively, above the EPA health advisory limit and applicable MassDEP standard of 0.07 ug/L. Because of the extremely low detection requirements, HW collected confirmatory samples from these two wells. Results showed 0.16 ug/L in HW-3 and 0.12 ug/L in HW-5. The concentrations detected in all the other wells were below 0.07 ug/L. It should be noted that these compounds were also detected above the EPA health advisory limit and applicable MassDEP standard in monitoring well HW-1, located at the upgradient, western boundary of the Airport.

## 2.2 Actions Under the IRA Plan

A summary of the sampling and analyses conducted to date for both 1,4-dioxane and the PFAS compounds is provided below. This includes activities conducted between April 2019 and October 2019 which included soil and groundwater sampling for PFAS and/or 1,4-dioxane. Additionally, spray water samples were collected from six discharge locations on an Airport fire truck where aqueous film forming foam (AFFF) has historically been sprayed from. AFFF has not been sprayed at the Airport since 2015. However, Airport fire trucks are equipped with AFFF in the event of an emergency requiring the deployment of foam.

## 3.0 APPLICABLE MCP STANDARDS

In accordance with MCP Section 310 CMR 40.0900, the characterization of risk of harm to health, safety, public welfare, and the environment must be evaluated at each disposal site. This characterization includes the determination of site-specific soil and groundwater categories based on site location and use, and the comparison of laboratory results to these standards (310 CMR 40.0930).

Pursuant to 310 CMR 40.0933, the applicable soil category is selected based upon the frequency, intensity of use, and accessibility of the Airport by adults and children. Based on these criteria, soil at the Airport is category S-1/GW-1 and SW-1/GW-3, which are the most stringent categories

Groundwater located within a Current Drinking Water Source Area is considered category GW-1. The Airport is located within several zones of contribution (Zone II) for Barnstable Village, the Hyannis Water District and the Town of Yarmouth. Zone IIs are considered current drinking water sources as defined in 310 CMR 40.0006; thus, category GW-1 is applicable.

Groundwater located within 30 feet of an occupied building that has an average annual depth of less than 15 feet is categorized as GW-2. This is primarily a concern because of the possibility of vapor impacts to indoor air. The average annual depth to groundwater at the site is greater than 15 feet; therefore GW-2 Standards do not apply. Also, all disposal sites shall be considered a potential source of discharge to surface water, and therefore categorized as GW-3. Based on these criteria, categories GW-1 and GW-3 are applicable to this site.

The current and proposed (2019 proposed MCP Revisions) soil and groundwater standards applicable to the Airport for PFAS and 1,4-dioxane are as follows:

PFAS*							
Current Soil Standard		Proposed Soil Standards		Current ORSG Groundwater Value***		Proposed Groundwater Standard	
S-1/GW-1	SW-1/GW-3	S-1/GW-1	SW-1/GW-3**	GW-1	GW-3	GW-1	GW-3**
None	None	0.2 ug/kg	300 ug/kg	0.07 ug/L	None	0.02 ug/L	500 - 40,000 ug/L

\* PFAS is the sum of perfluorodecanoic Acid ("PFDA"), perfluoroheptanoic acid (PFHpA), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA), perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA)

\*\*The proposed S-1/GW-3 standard and the proposed GW-3 standard is not for the sum of PFAS but rather for each of the individual six PFAS compounds listed above.

\*\*\*The current ORSG groundwater value for PFAS is the sum of the PFAS compounds above, excluding PFDA.

1,4-dioxane							
Current Soil Standard		Proposed Soil Standards		Current Groundwater Value		Proposed Groundwater Standard	
S-1/GW-1	SW-1/GW-3	S-1/ GW-1	SW-1/GW-3	GW-1	GW-3	GW-1	GW-3
200 ug/kg	20,000 ug/kg	No Change	No Change	0.3 ug/L	50,000 ug/L	No Change	No Change

#### 4.0 HISTORIC FIELD INVESTIGATIONS

Historic field investigations conducted since the November 2016 NOR and documented in prior status reports are summarized below:

- The installation of groundwater monitoring wells at six locations installed in April 2017: in the vicinity of potential sources of PFAS at the Air Rescue and Fire Fighting (ARFF) Building, at the firefighting training deployment area adjacent to the East Ramp, and at upgradient locations to evaluate potential off-site sources of PFAS and 1,4-dioxane.
- The first round of groundwater samples for PFAS and 1,4-dioxane were collected on April 5-7 and April 11, 2017. Additional groundwater samples and one surface water sample were collected for analysis of PFAS on June 20, 2017.
- An initial round of three soil samples were collected on December 6, 2016 as reported in the first status report. One sample was taken from each location where it was determined that AFFF had been used at the Airport, including the site of an airplane crash in 1981, the Deployment Area, and the 1991 Drill Location along the dirt road adjacent to the Deployment Area.
- A second round of soil samples were collected on June 20, 2017 adjacent to the ARFF building and within the deployment area to begin to determine the extent of PFAS within the surface soils. Based on the results of these analyses, a third round of samples from these two locations were collected on September 26, 2017. The third round of sampling was designed to further delineate the extent of PFAS in soils both horizontally and vertically, with samples taken at the ground surface and at two and four feet below ground surface (BGS).
- In October 2017, three composite soil samples were taken from piles of sediment and topsoil associated with the redevelopment of Runway 15/33. These piles were located on Airport property at the site of the former Mildred's Restaurant and were analyzed for PFAS compounds to evaluate if sediment removed from the Airport as part of this redevelopment contained PFAS.

- Two samples of AFFF concentrate have also been analyzed for PFAS compounds to evaluate the foam previously used at the Airport and that the foam that is currently in use.
- Six PFAS soil samples were also analyzed for leaching potential using an SPLP test between September and October 2017. The chosen samples included four samples from within the boundaries of the PFAS sites at the Airport and two samples from runway reconstruction soils stockpiled at the Airport.
- On August 14, 2018, 24 PFAS surface soil samples were collected in proximity to the ARFF Building and the Deployment Area. PFAS compounds were previously detected in these areas and additional samples were collected to determine the vertical extent of PFAS impacts in soil and to refine the Disposal Site boundary at the Airport.
- In October 2018, three soil borings (DL11, DL14 and HW-F) were advanced in the deployment area. One soil boring (ARFF3) was advanced and one surface soil sample (HW-3) was collected near the ARFF Building in order to further delineate the extent of PFAS in soils both horizontally and vertically. All soil borings were advanced using direct push methods.
- In October 2018, six monitoring wells were installed at the Airport. A cluster of three wells (HW-G(s), HW-G(m), and HW-G(d)) was installed at an upgradient location to evaluate potential off-site sources of PFAS. Three additional wells (HW-H, HW-I, and HW-J) were installed southeast of the Deployment Area adjacent to the East Ramp.
- In November 2018, six groundwater samples were collected to evaluate PFAS concentrations in the Deployment Area. Four groundwater samples and one surface water sample from Mary Dunn Pond were also collected for analysis of oxygen and hydrogen isotopes to determine the contribution of pond water from Mary Dunn Pond to the four downgradient wells.
- In December 2018, two soil samples were collected from the 1991 Drill Location to determine if PFAS detected in the area are related to background conditions.
- In December 2018, 12 groundwater samples were collected for analysis of PFAS and 13 groundwater samples were collected for analysis of oxygen and hydrogen isotopes to determine the contribution of pond water from Mary Dunn Pond to the 13 downgradient wells. Groundwater samples were also collected from four monitoring wells in the Maher Wellfield for analysis of 1,4-dioxane.
- In February 2019, three additional surface soil samples were collected to further delineate the Disposal Site boundary around the ARFF building.

Soil, surface water and groundwater sampling locations are indicated on Figures 2 through 4. Tabulated soil and groundwater data are included on Tables 1 through 4. Laboratory data

packages and soil boring logs associated with historic field investigations have previously been submitted to MassDEP and are available in other IRA Status Reports.

## 5.0 FIELD INVESTIGATIONS CONDUCTED DURING THE CURRENT REPORTING PERIOD

Details concerning field investigations conducted between April 2019 and October 2019 are summarized below.

- In May and June 2019, HW installed nine groundwater monitoring wells to delineate the vertical and horizontal extent of PFAS and 1,4-dioxane at the Airport and on adjacent hydraulically upgradient properties.
  - Two deep groundwater monitoring wells (HW-D(d) and HW-D(dd)) were installed next to an existing well, HW-D, at an upgradient location to evaluate potential off-site sources of PFAS. These wells were advanced to approximately 45 feet and 65 feet below grade, respectively. Groundwater in this area is approximately 19 feet below grade. The well locations are indicated on Figure 2.
  - Three shallow groundwater monitoring wells (HW-M, HW-N, and HW-O) were installed off Airport property within the Town of Barnstable right-of-way. These hydraulically upgradient locations were chosen to evaluate if PFAS and 1,4-dioxane are entering the Airport property from unknown off-site sources. These wells were advanced to approximately 27 feet, 22 feet and 14 feet below grade, respectively. These shallow wells were advanced approximately five feet into the groundwater table. The well locations are indicated on Figure 2.
  - Two deep groundwater monitoring wells (HW-I[m] and HW-I[d]) were installed adjacent to an existing shallow groundwater well (HW-I), located within the Deployment Area. These wells were advanced to determine the vertical extent of PFAS in the Deployment Area. These wells were advanced to approximately 35 feet and 42 feet below grade, respectively. Groundwater in this area is approximately 16 feet below grade. The well locations are indicated on Figure 2.
  - One deep groundwater monitoring well (HW-K) was installed adjacent to the Steamship Authority parking lot to evaluate PFAS concentrations hydraulically downgradient of the ARFF Building. The well was advanced to approximately 44 feet below grade. Groundwater in this area is approximately 20 feet below grade. The well location is indicated on Figure 2.
  - One deep groundwater monitoring well (HW-L) was installed west of the ARFF Building to evaluate 1,4-dioxane and PFAS concentrations in this area. The well was advanced to approximately 70 feet below grade. Groundwater in this area is approximately 19 feet below grade. The well location is indicated on Figure 2.
- In June 2019, eight groundwater samples were collected from newly installed groundwater monitoring wells HW-L, HW-K, HW-I (m), HW-I (d), HW-M, HW-D(d), HW-D



(dd), and HW-N for PFAS. Analytical results are included on Table 1 and the location of the monitoring wells are indicated on Figure 2. The Laboratory report for the samples are included in Appendix A.

- In July 2019, one groundwater sample was collected from newly installed groundwater monitoring wells HW-O for PFAS. Analytical results are included on Table 1 and the location of the monitoring well is indicated on Figure 2. The laboratory report for the sample is included in Appendix A.
- In July 2019, one groundwater sample was collected from newly installed groundwater monitoring wells HW-L for 1,4-dioxane. Analytical results are included on Table 2 and the location of the monitoring well is indicated on Figure 2. The laboratory report for the sample is included in Appendix A.
- In July 2019, two surface water samples were collected from Upper Gate and Lewis Ponds. Analytical results are included on Table 1 and the location of the surface water sampling points are indicated on Figure 2. The laboratory report for the samples are included in Appendix A.
- In August 2019, four groundwater samples were collected from monitoring wells HW-N, HW-A(d), HW-O, and HW-1 to evaluate potential sources of 1,4-dioxane entering the Airport from unknown upgradient sources(s). Analytical results are included on Table 2 and the location of the monitoring wells are indicated on Figure 2. The laboratory report for the samples is included in Appendix A.
- In August 2019, one groundwater sample was collected from groundwater monitoring well HW-E for PFAS. Analytical results are included on Table 2 and the location of the monitoring well is indicated on Figure 2. The laboratory report for the sample is included in Appendix A.
- In August 2019, soil sample DL 11 (0-1) was collected from the Deployment Area. Analytical results are included on Table 3 and the location of the soil sample is indicated on Figure 4. The laboratory report for the sample is included in Appendix A.
- In August 2019, six spray water samples were collected from discharge locations on a fire truck at the Airport. The samples were collected to determine the concentration of residual PFAS (if any) that remained within the truck. The purpose of this sampling was to determine the appropriateness of spraying water from the equipment as recommended by the manufacturer in areas outside of the known disposal site boundary after these areas are capped in 2020, pending MassDEP approval of the IRA Modification submitted in October 2019. Foam has not been sprayed at the Airport since 2015. However, the fire trucks do store foam within them in the event they are needed to respond to an emergency. The equipment manufacturer recommends that water be sprayed from the trucks daily to verify that they work and are ready in the event of an emergency. The water sprayed from the trucks **should not contain any**

**foam or foam residue.** As shown in Table 5, the water exiting the tested truck contained PFAS at concentrations above the proposed GW-1 standard. The Airport contacted the equipment manufacturer immediately to determine any potential sources of PFAS that could have skewed the results. The manufacturer recommended checking components within the valve mechanism for AFFF that may have become worn out and allowed a finite amount of the stored AFFF to be mixed with the water even though the mechanism was not engaged. The Airport has ordered replacement parts and plans to replace the mechanism immediately. Once the mechanism has been replaced, the Airport intends to retest the equipment by collecting samples of the spray water for laboratory analysis to verify that the new mechanism is working appropriately.

## 6.0 GROUND WATER MODELING AND CONTAMINANT TRANSPORT ANALYSIS

MassDEP requested that the Airport evaluate if potential sources on the western portion of the Airport could be upgradient of the Mary Dunn Wellfield. To answer this question, HW is using and modifying an existing U.S. Geological Survey groundwater model to evaluate groundwater flow under current and recent historical pumping conditions. This work is ongoing and will be finalized in the Phase II Comprehensive Site Assessment due to MassDEP in November 2020. The model will be used to document what areas of the Airport are upgradient of the Mary Dunn Wellfield. It will also be used to evaluate groundwater flow and contaminant transport from potential source areas on Airport property, as well as groundwater flow from the Fire Training Academy across the Airport to the southeast.

## 7.0 MANAGEMENT OF REMEDIAL WASTE

No remedial waste has been generated to date as a result of the work conducted under the IRA Plan.

## 8.0 UPGRADES TO AFFF TESTING PROTOCOLS AT THE AIRPORT

The Airport has purchased two Ecologic Foam Test Systems to allow the Airport to test the AFFF delivery systems on its fire trucks without having to discharge the foam into the environment. These new systems meet the Federal Aviation Administration requirements for the regular testing of AFFF usage. Therefore, it is anticipated that no further foam will be deployed at the Airport except during an emergency situation when its use is required.

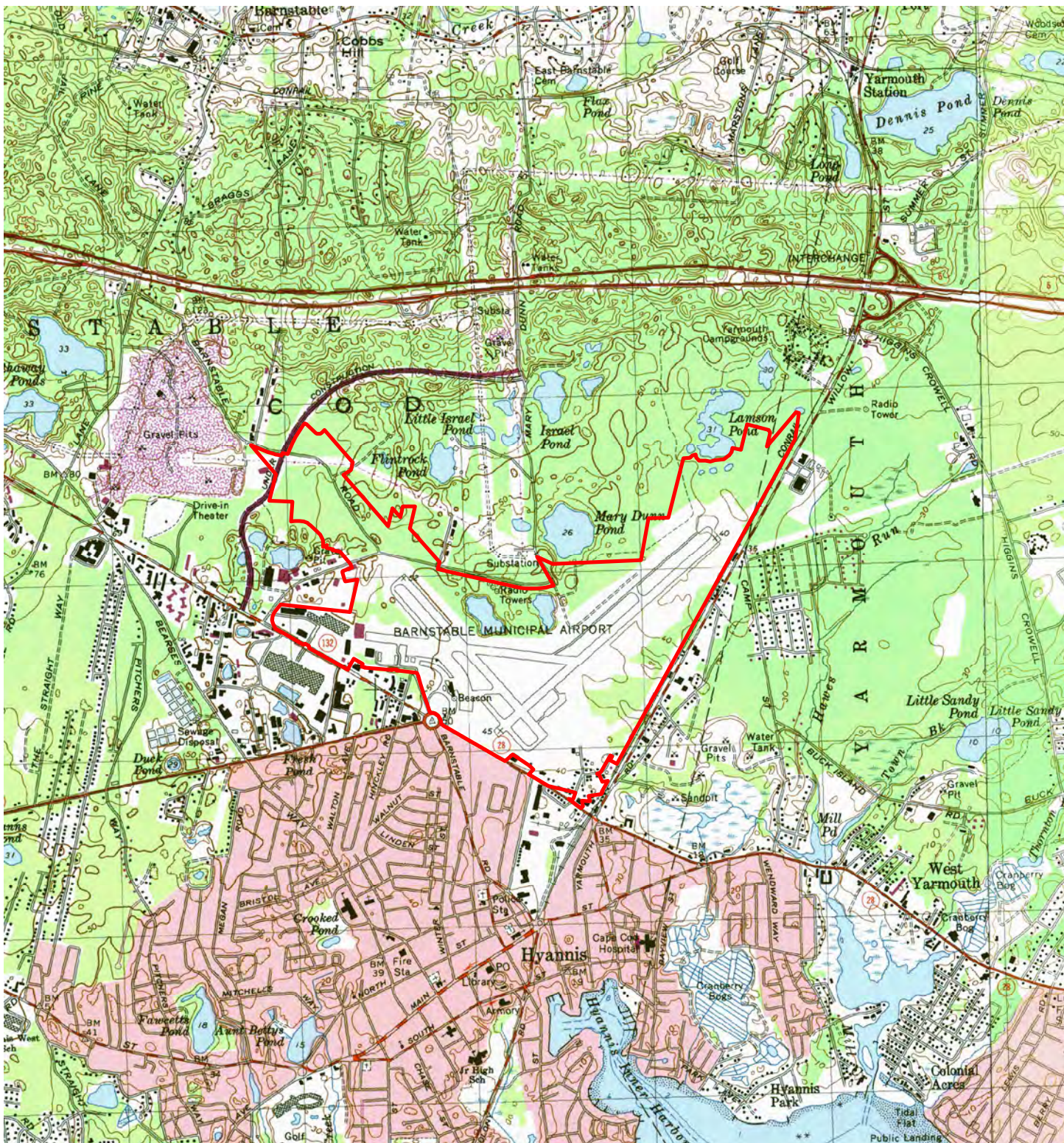
## 9.0 PLANS FOR NEXT REPORTING PERIOD

Further testing of soil and groundwater is planned to refine the disposal site boundaries in the Deployment Area and ARFF Building Area. Retesting of the spray water exiting the fire truck is also planned. Additionally, an IRA Modification was submitted to the MassDEP in October 2019 detailing a proposed temporary cap over an approximate 2.25-acre portion of the Deployment Area and ARFF Building Area.

### FIGURES

- 1- USGS Locus Map
- 2- Monitoring Well Locations
- 3- PFAS Sampling Locations ARFF Building Area
- 4- PFAS Sampling Locations Deployment Area





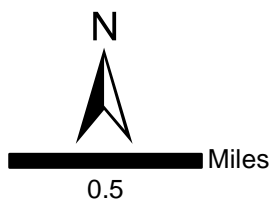
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## Legend



Airport Property Line

\*Hyannis Topographic Quadrangle



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USGS Locus Map  
Barnstable Municipal Airport  
Hyannis, MA

Date: 4/17/2018

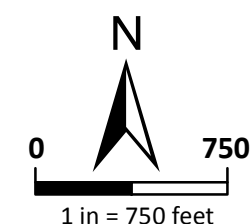
Figure 1





**Legend**

- Monitoring Wells
- Drinking Water Wells
- Surface Water Location
- Barnstable Municipal Airport Property Boundary



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Monitoring Well Locations  
Barnstable Municipal Airport  
Hyannis, MA





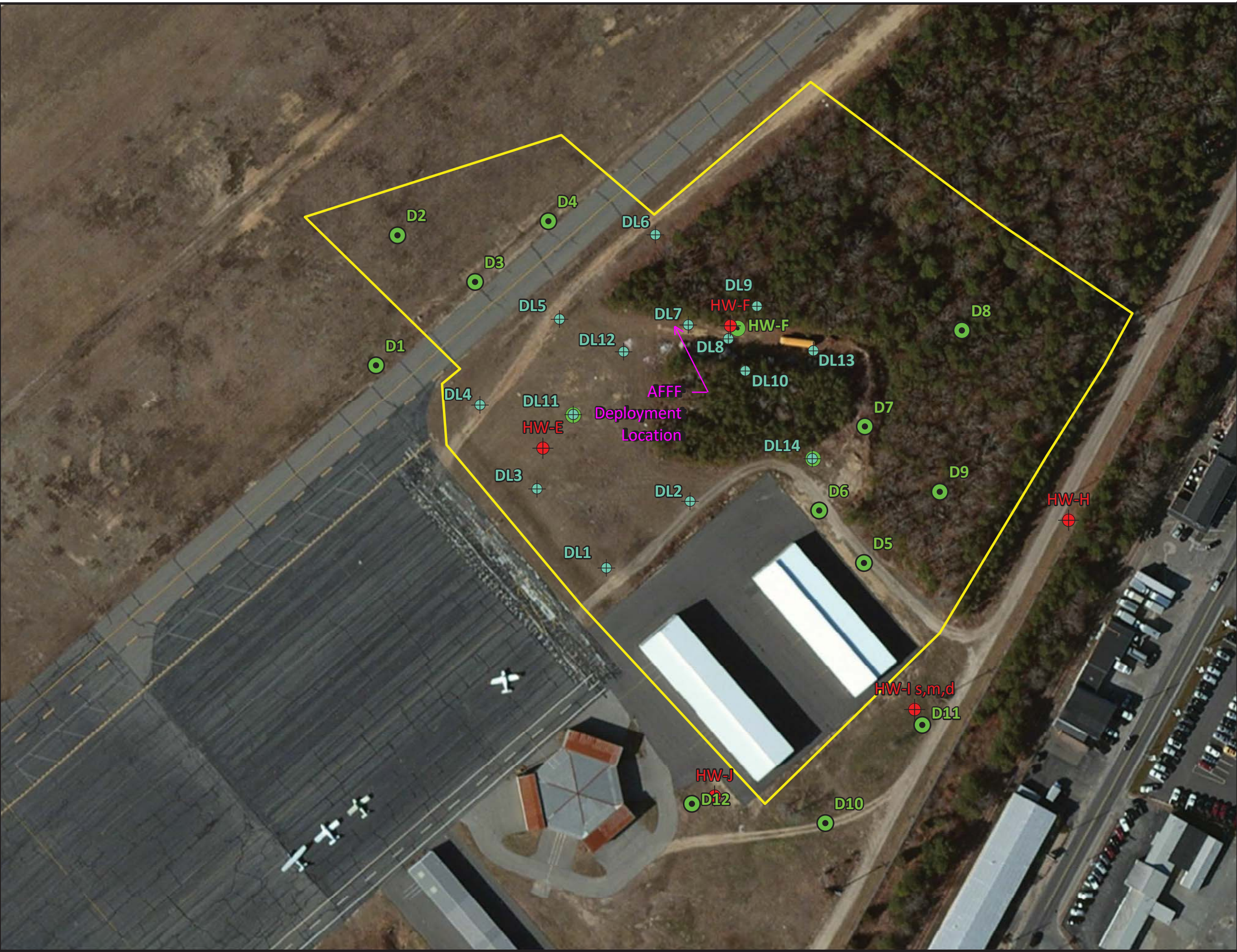
**Legend**

- 2017 PFAS Soil Samples
- 2018 PFAS Soil Samples
- 2019 PFAS Soil Samples
- Monitoring Wells
- Barnstable Municipal Airport Property Boundary
- Approximate Disposal Site Boundary for ARFF Building Area






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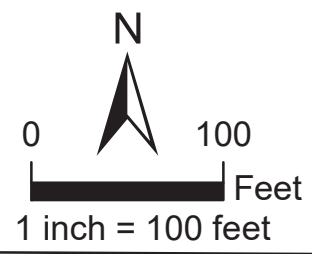
PFAS Sampling Locations  
ARFF Building Area  
Barnstable Municipal Airport  
Hyannis, MA





**Legend**

-  2017 PFAS Soil Samples
-  2018 PFAS Soil Samples
-  Monitoring Wells
-  Barnstable Municipal Airport Property Boundary
-  Approximate Disposal Site Boundary for Deployment Area



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PFAS Sampling Locations  
Deployment Area  
Barnstable Municipal  
Airport Hyannis, MA



### TABLES

- 1- Groundwater and Surface Water Results for PFAS Compounds
- 2- Groundwater Results for 1,4-Dioxane
- 3- Soil Results for PFAS Compounds
- 4- Ratio of Stable Isotopes Oxygen –18 and Hydrogen-2
- 5- Fire Truck Results for PFAS Compounds



Table 1. Groundwater and Surface Water Results for PFAS Compounds ug/L

	North Ramp											Lewis Pond Area	Airport Road Area								Surface Water			ARFF Building	
Sample ID	HW-1	HW-1	HW-1	HW-4M	HW-5	HW-5	HW-5	HW-23	HW-23	HW-19D	HW-19D	HW-401S	HW-A(S)	HW-B(S)	HW-B(S)	HW-B(D)	HW-M	HW-N	HW-O	HW-C	Kmart	LP-1	UGP-1	HW-L	
Sample Date	7/1/2016	6/20/2017	10/26/2018	4/5/2017	7/1/2016	4/7/2017	10/26/2018	6/20/2017	10/26/2018	6/20/2017	11/7/2018	4/7/2017	4/7/2017	4/7/2017	10/26/2018	10/26/2018	6/24/2019	6/24/2019	7/2/2019	4/7/2017	6/20/2017	7/11/19	7/11/19	6/19/2019	
Perfluoroheptanoic acid (PFHpA)	0.01	0.0042 J	0.013 J	0.007 J	0.0041	0.0084 J	0.0074 U	0.0045J	0.0098 J	0.0052 J	0.0080 J	0.0043 J	0.0048 J	0.049	0.012 J	0.0074 U	0.007	0.0034	<0.002	0.0033 U	0.0033 U	<0.01	<0.02	0.0078	
Perfluorohexanesulfonic acid (PFHxS)	0.018	0.065	0.018 J	0.02	0.011	0.018 J	0.0056 U	0.021	0.023	0.046	0.045	0.011 J	0.0079 J	0.044	0.047	0.0056 U	0.016	0.033	0.0043	0.0034 U	0.0034 U	<0.01	<0.02	0.033	
Perfluorononanoic acid (PFNA)	<0.002	0.0057 J	0.0087 U	0.0046 U	<0.002	0.0046 U	0.0088 J	0.0038 U	0.0087 U	0.0065 J	0.0087 U	0.0046 U	0.0046 U	0.0046 U	0.0087 U	0.0087 U	<0.002	<0.002	<0.002	0.0046 U	0.0043 J	<0.01	<0.02	0.0033	
Perfluorooctanoic acid (PFOA)	0.017	0.022	0.031	0.011 J	0.12	0.020 J	0.011 J	0.0046 U	0.011 J	0.017 J	0.014 J	0.0046 U	0.0026 U	0.0094 J	0.020 J	0.012 J	0.027	0.0088	0.0039	0.0026 U	0.0026 U	<0.01	<0.02	0.025	
Perfluorooctane sulfonate (PFOS)	0.033	0.24	0.028	0.043	0.031	0.052	0.12	0.0079 J	0.015 J	0.061	0.069	0.012 J	0.0046 U	0.026	0.019 J	0.010 J	0.0074	0.004	0.017	0.0046 U	0.0046 U	<0.01	<0.02	0.049	
Perfluorodecanoic Acid (PFDA)	NA	0.0040 U	0.0061 U	0.0040 U	NA	0.0040 U	0.0061 U	0.0040 U	0.0061 U	0.0040 U	0.0061 U	0.0040 U	0.0040 U	0.0040 U	0.0061 U	0.0061 U	<0.002	<0.002	0.0021	0.0040 U	0.0040 U	<0.01	<0.02	<0.002	
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	0.078	0.3369	0.09	0.081	0.1661	0.0984	0.1398	0.0334	0.0588	0.1357	0.136	0.0273	0.0127	0.1284	0.098	0.022	0.0574	0.0492	0.0273	<0.0046	0.0043	<0.01	<0.02	0.1181	
	Solar Field						Steamship Parking Lot								Deployment Area										
Sample ID	HW-D	HW-D (d)	HW-D (dd)	HW-G(S)	HW-G(M)	HW-G(D)	HW-2	HW-3	HW-3	HW-3	HW-300	HW-301	HW-302	HW-302	HW-K	HW-I *	HW-I (m)	HW-I (d)	HW-J	HW-E	HW-E	HW-E	HW-F	HW-F	HW-H
Sample Date	4/7/2017	6/24/2019	6/24/2019	12/3/2018	12/3/2018	12/3/2018	7/1/2016	7/1/2016	4/5/2017	10/26/2018	7/1/2016	7/1/2016	7/1/2016	12/3/2018	6/19/2019	11/7/2018	6/24/2019	6/24/2019	11/7/2018	4/5/2017	11/7/2018	8/19/2019	4/5/2017	11/7/2018	11/7/2018
Perfluoroheptanoic acid (PFHpA)	0.0033 U	0.021	<0.002	0.0074 U	0.0074 U	0.0074 U	0.0071	0.016	0.1	0.10	0.0096	0.002	0.019	0.015 J	0.0051	0.2	0.0032	0.0053	0.025	0.15	0.0074 U	0.0053	0.34	0.0074 U	0.077
Perfluorohexanesulfonic acid (PFHxS)	0.0089 J	0.062	0.0092	0.0056 U	0.012 J	0.0056 U	0.0035	0.0043	0.020 J	0.012 J	0.012	0.038	0.0063	0.016 J	<0.002	0.18	0.019	0.057	0.0056 U	0.042	0.0056 U	0.0021	0.019J	0.0056 U	0.0056 U
Perfluorononanoic acid (PFNA)	0.0046 U	0.015	0.0041	0.0087 U	0.011 J	0.0087 U	<0.002	0.0063	0.027	0.023	<0.002	<0.002	0.054	0.0097 J	<0.002	0.16	<0.002	<0.002	0.028	0.0087 J	0.0087 U	<0.002	0.0046 U	0.0087 U	0.0087 U
Perfluorooctanoic acid (PFOA)	0.0046 U	0.0088	<0.002	0.0033 U	0.0033 U	0.0033 U	0.012	0.084	0.065	0.057	0.017	0.011	0.014	0.03	0.0041	0.26	0.0061	0.0047	0.026	0.053	0.0033 U	0.0047	0.075	0.0033 U	0.0050 J
Perfluorooctane sulfonate (PFOS)	0.022	0.095	0.013	0.0060 U	0.036	0.0060 U	0.0063	0.0091	0.15	0.053	0.0052	0.0037	0.033	0.031	<0.002	0.066	0.014	0.012	0.13	0.047	0.0060 U	<0.002	0.0026 U	0.0060 U	0.0060 U
Perfluorodecanoic Acid (PFDA)	0.0040 U	<0.002	<0.002	0.0061 U	0.0061 U	0.0061 U	NA	NA	0.0040 U	0.0061 U	NA	NA	NA	0.0061 U	<0.002	0.012 U	<0.002	<0.002	0.0061 U	0.0040 U	0.0061 U	<0.002	0.0040 U	0.0061 U	0.0061 U
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	0.0309	0.2018	0.0263	0.0087 U	0.059	0.0087 U	0.0289	0.1197	0.362	0.245	0.0438	0.0547	0.1263	0.1017	0.0092	0.866	0.0423	0.079	0.209	0.3007	0.0087 U	0.0121	0.434	0.0087 U	0.082
	Maher Wells																								
Sample ID	OW-9S	OW-9S	OW-9M	OW-9D	OW-9D	OW-9DD	OW-9DD	OW-18S	OW-18S	OW-18M	OW-18M	OW-18D	OW-18D	OW-18D Duplicate	OW-18D	OW-19D									
Sample Date	7/5/2016	12/3/2018	12/3/2018	7/5/2016	12/3/2018	4/11/2017	12/3/2018	7/5/2016	12/7/2018	7/5/2016	12/7/2018	7/5/2016	4/11/2017	7/5/2016	12/7/2018	4/11/2017									
Perfluoroheptanoic acid (PFHpA)	0.014	0.048	0.11	0.0028	0.033	0.034	0.015 J	0.0071	0.0074 U	0.0029	0.0074 U	0.0071	0.015J	0.0063	0.014 J	0.0051J									
Perfluorohexanesulfonic acid (PFHxS)	<0.003	0.023	0.0056 U	0.012	0.12	0.12	0.042	0.0068	0.0056 U	0.016	0.073	0.01	0.13	0.011	0.13	0.029									
Perfluorononanoic acid (PFNA)	0.0077	0.0087 U	0.044	0.0036	0.1	0.059	0.038	<0.002	0.0087 U	0.0076	0.0087 U	0.0065	0.0046 U	0.0058	0.0087 U	0.006J									
Perfluorooctanoic acid (PFOA)	0.0074	0.032	0.052	0.041	0.057	0.055	0.020 J	0.0083	0.012 J	0.044	0.0060 J	0.018	0.025	0.019	0.019 J	0.0046 U									
Perfluorooctane sulfonate (PFOS)	0.007	0.024	0.0081 J	0.0052	0.52	0.5	0.14	0.018	0.028	0.0058	0.24	0.0059	0.22	0.0059	0.32	0.029									
Perfluorodecanoic Acid (PFDA)	NA	0.0061 U	0.0061 U	NA	0.0061 U	0.0040 U	0.0061 U	NA	0.0061 U	NA	0.0061 U	NA	0.0040 U	NA	0.0061 U	0.0040 U									
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	0.0361	0.127	0.2141	0.0646	0.83	0.768	0.255	0.0402	0.04	0.0763	0.319	0.0475	0.39	0.048	0.483	0.0691									

Notes:

< = Not detected by the laboratory above the reporting limit. Reporting limit shown.

J = Estimated concentration between the method detection limit and reporting limit.

Results in ug/L, micrograms per liter.

U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.

Bold results above proposed MassDEP GW-1 standard (0.02 ug/L)

Note: Totals include estimated values and do not include non-detects (U or <)

NA = Analyte not included in laboratory results

Table 2. Groundwater Results for 1,4 Dioxane ug/L

	North Ramp					Airport Road					ARFF Building	Maher Well Field								
Sample ID	HW-1	HW-4D	HW-4M	HW-207D	HW-19D	HW-A(D)	HW-B(D)	HW-N	HW-A(D)	HW-O	HW-L	OW-9DD	OW-18M	OW-18D	OW-19D	OW-19M	OW-9D	OW-9DD	OW-18D	OW-19D
Sample Date	8/5/2019	4/5/2017	4/5/2017	4/5/2017	4/5/2017	4/5/2017	4/5/2017	8/5/2019	8/5/2019	8/5/2019	7/2/2019	4/11/2017	4/11/2017	4/11/2017	4/11/2017	4/11/2017	12/3/2018	12/3/2018	12/7/2018	12/7/2018
1,4-Dioxane	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<b>0.727</b>	<b>0.838</b>	<0.25	<b>0.552</b>	<b>0.800</b>	<0.25	<0.25	<b>0.732</b>	<0.25	<0.25

Notes:

Results in ug/L, micrograms per liter

< = Not detected by the laboratory above the reporting limit. Reporting limit shown.

Bold results above MassDEP GW-1 standard (0.3 ug/L)

Table 3. Soil Results for PFAS Compounds ug/kg

	ARFF Building																						
Sample ID	ARFF1 (0-1')	ARFF1 (2')	ARFF1 (4')	ARFF2 (0-1')	ARFF3 (0-1')	ARFF4 (0-1')	ARFFCB (0-1)	A1 (0-1')	A2 (0-1')	A3 (0-1')	A4 (0-1')	A5 (0-1')	A6 (0-1')	A7 (0-1')	A8 (0-1')	A9 (0-1')	A10 (0-1')	A11 (0-1')	A12 (0-1')	ARFF3 (10-12')	A13 (0-1')	A14 (0-1')	A15 (0-1')
Sample Date	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	9/26/2017	9/26/2017	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	10/9/2018	2/27/2019	2/27/2019	2/27/2019
Perfluoroheptanoic acid (PFHpA)	0.82 J	1.8	0.66 J	0.17 U	0.60 J	0.75 J	0.60 J	0.19 U	0.19 U	0.38 J	0.19 U	1.1	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.32 J	<2.0	<1.9	<2.0
Perfluorohexanesulfonic acid (PFHxS)	0.23 U	0.23 U	0.23 U	0.23 U	0.64 J	0.23 U	0.23 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	<2.0	<1.9	<2.0
Perfluorooctanoic acid (PFOA)	0.75 J	2.6	0.75 J	0.26 U	0.78 J	0.97 J	0.90 J	0.25 U	0.25 U	0.37 J	0.30 J	1.9	0.25 U	0.25 U	0.25 U	0.34 J	0.25 U	0.25 U	0.25 U	1.9	<2.0	<1.9	<2.0
Perfluorononanoic acid (PFNA)	2.5	5.7	1.4	0.20 J	0.91 J	2.9	0.17 U	0.22 U	0.22 U	0.51 J	0.22 U	0.87 J	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	3.1	<2.0	<1.9	<2.0
Perfluorooctane sulfonate (PFOS)	4.5	2.7	1.1	0.29 J	4.4	1.0	1.1	0.26 U	0.26 U	0.29 J	0.26 U	0.26 U	0.26 U	0.38 J	0.26 U	0.85 J	0.26 U	0.26 U	0.26 U	1.1	<2.0	<1.9	<2.0
Perfluorodecanoic Acid (PFDA)	4.4	1.2	0.62 J	0.13 U	1.6	0.85 J	0.13 U	0.28 U	0.28 U	0.42 J	0.28 U	1.4	0.28 U	0.28 U	0.28 U	0.28 U	0.33 J	0.28 U	0.28 U	0.28 U	<2.0	<1.9	<2.0
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	12.97	14	4.53	0.49	8.93	6.47	2.6	0.28 U	0.28 U	1.97	0.3	5.27	0.28 U	0.38	0.28 U	1.19	0.33	0.28 U	0.28 U	6.42	<2.0	<1.9	<2.0
	Deployment Area																						
Sample ID	DL1(0-1')	DL2 (0-1')	DL2 2'	DL2 4'	DL3 (0-1')	DL3 2'	DL3 4'	DL4 (0-1')	DL4 2'	DL4 4'	DL5 (0-1')	DL5 2'	DL5 4'	DL6 (0-1')	DL7 (0-1')	DL8 (2')	DL8 (4')	DL9 (0-1')	DL10 (0-1')	DL 11 (0-1')	DL 11 (0-1')	DL12 (0-1')	DL13 (0-1')
Sample Date	6/20/2017	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	9/26/2017	6/20/2017	6/20/2017	6/20/2017	9/26/2017	6/20/2017	6/20/2017	9/26/2017	8/20/2019	9/26/2017	9/26/2017
Perfluoroheptanoic acid (PFHpA)	0.30 J	1.9	1.2	0.48 J	0.84 J	0.17 U	0.17 U	0.31 J	0.17 U	0.17 U	2.5	0.40 J	0.50 J	5.0	2.5 J	2.9 J	4.7J	0.66 J	1.3	2.1	1.8	1.2	1.6
Perfluorohexanesulfonic acid (PFHxS)	0.23 U	1.8	1.3	0.59 J	0.34 J	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.49 J	0.49 J	0.23 U	0.23 U	2.3 U	2.3 U	2.3 U	0.35 J	0.94 J	0.82 J	<0.9	0.23 U	0.23 U
Perfluorooctanoic acid (PFOA)	0.26 U	1.6	4.1	0.74 J	0.80 J	0.26 U	0.26 U	0.83 J	0.26 U	0.26 U	3.7	1.6	0.26 U	0.26 U	4.2 J	25	22	0.68 J	1.7	4.7	5.2	4.6	2.4
Perfluorononanoic acid (PFNA)	0.17 U	0.81 J	2.5	0.17 U	0.55 J	0.17 U	0.17 U	2.7	0.17 U	0.55 J	0.19 J	0.17 U	0.17 U	0.19 J	9.6 J	46	1.7 U	0.22 J	0.17 U	16	2.4	7.3	1.5
Perfluorooctane sulfonate (PFOS)	0.40 J	12	1.5	0.21 U	0.51 J	0.21 U	0.21 U	2.0	0.21 U	0.50 J	0.21 U	0.21 U	0.21 U	0.21 U	3.9 J	14	2.1 U	0.38 J	0.26 J	29	1.5	23	0.66 J
Perfluorodecanoic Acid (PFDA)	0.63 J	0.13 U	0.13 U	0.13 U	1.4	0.13 U	0.13 U	1.3	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	1.3 U	1.3 U	1.3 U	0.13 U	0.13 U	1.8	8.7	0.66 J	7.4
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	1.33	18.11	10.6	1.81	4.44	0.23 U	0.23 U	7.14	0.23 U	4.2	6.88	2.49	0.5	5.19	20.2	87.9	26.7	2.29	4.2	54.42	19.6	36.76	13.56
	Deployment Area																						
Sample ID	DL14 (0-1')	D1 (0-1')	D2 (0-1')	D3 (0-1')	D4 (0-1')	D5 (0-1')	D6 (0-1')	D7 (0-1')	D8 (0-1')	D9 (0-1')	D10 (0-1')	D11 (0-1')	D12 (0-1')	DL11 (4-6')	DL11 (10-12')	DL11 (14-16')	DL14 (0-1')	DL14 (4-6')	DL14 (10-12')	DL14 (14-16')	HW-F (10-12')	HW-F (14-16')	HW-3 (0-1')
Sample Date	9/26/2017	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	10/4/2018	10/4/2018	10/4/2018	9/26/2017	10/4/2018	10/4/2018	10/4/2018	10/4/2018	10/4/2018	10/9/2018
Perfluoroheptanoic acid (PFHpA)	4.9	0.19 U	0.21 J	0.19 U	0.95 J	0.22 J	0.25 J	7.8	1.0	2.7	0.19 U	0.19 U	0.19 U	1.3	0.31 J	0.23 J	4.9	0.36 J	0.19 U	1.4	0.32 J	1.3	0.19 U
Perfluorohexanesulfonic acid (PFHxS)	0.71 J	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.31 J	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.71J	0.24 U	0.24 U	0.74 J	0.24 U	0.24 U	0.24 U
Perfluorooctanoic acid (PFOA)	23	0.25 U	0.33 J	0.25 U	1.1	0.25 U	0.28 J	14	2.2	3	0.25 U	0.25 U	0.25 U	2.9	1.9	0.50 J	23	0.58 J	0.32 J	2.9	0.25 U	1.4	0.25 U
Perfluorononanoic acid (PFNA)	10	0.22 U	0.67 J	0.22 U	0.98 J	0.22 U	0.22 U	10	0.59 J	0.83 J	0.22 U	0.22 U	0.32 J	2.5	0.22 U	0.22 U	10	0.22 U	0.22 U	10	0.22 U	0.22 U	0.22 U
Perfluorooctane sulfonate (PFOS)	7.6	0.26 U	0.66 J	0.38 J	2.9	0.26 U	0.26 U	3.4	2.1	0.67 J	0.54 J	0.91 J	0.44 J	0.26 U	0.26 U	0.26 U	7.6	0.26 U	0.26 U	2.3	0.26 U	0.26 U	0.26 U
Perfluorodecanoic Acid (PFDA)	9.6	0.28 U	0.28 U	0.28 U	0.40 J	0.28 U	0.66 J	8.6	1.3	1.6	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	9.6	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	55.81	0.28 U	1.87	0.38	6.33	0.22	1.19	43.8	7.50	8.8	0.54	0.91	0.76	6.7	2.21	0.73	55.81	0.94	0.32	17.34	0.32	2.7	0.28 U
	1991 Drill Location																						
	1991A (0-1')	1991B (0-1')	1991C (0-1')	1991D (0-1')	1991A-B (3-4')	1991C-D (2-3')																	
	8/14/2018	8/14/2018	8/14/2018	8/14/2018	12/14/2018	12/14/2018																	
Perfluoroheptanoic acid (PFHpA)	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U																	
Perfluorohexanesulfonic acid (PFHxS)	0.24 U	0.66 J	0.24 U	0.24 U	0.24 U	0.24 U																	
Perfluorooctanoic acid (PFOA)	0.25 U	0.26 J	0.25 U	0.25 U	0.25 U	0.25 U																	
Perfluorononanoic acid (PFNA)	0.22 U	0.22 U	0.22 U	0.30 J	0.22 U	0.22 U																	
Perfluorooctane sulfonate (PFOS)	0.49 J	1.1	0.55 J	0.36 J	0.30 J	0.42 J																	
Perfluorodecanoic Acid (PFDA)	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U																	
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	0.49	2.02	0.55	0.66	0.3	0.42																	

Notes:  
< = Not detected by the laboratory above the reporting limit. Reporting limit shown.  
J = Estimated concentration between the method detection limit and reporting limit.  
Results in ug/kg, micrograms per kilogram.  
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.  
Bold results above proposed MassDEP S-1/GW-1 standard (0.2 ug/kg)  
Note: Totals include estimated values and do not include non-detects (U or <)

Table 4: Ratio of Stable Isotopes Oxygen-18 and Hydrogen-2 Laboratory Results

Sample Date	Lab Sample ID	HW Sample ID	Stable Isotope Oxygen-18			Stable Isotope Hydrogen-2		
			δ18O (V-SMOW)	Atm %	Expected Values	δ18O (V-SMOW)	Atm %	Expected Values
11/7/2018	1811299-2	HW-I	-6.92	0.20	-	-40.41	0.01494	-
			-6.77	0.20	-	-40.17	0.01495	-
	1811299-4	HW-E	-6.79	0.20	-	-38.56	0.01497	-
			-6.85	0.20	-	-38.87	0.01497	-
	1811299-5	HW-F	-6.9	0.20	-	-38.28	0.01498	-
			-6.88	0.20	-	-38.15	0.01498	-
	1811299-7	SW-2	-2.67	0.20	-	-18.65	0.01528	-
			-2.61	0.20	-	-20.42	0.01526	-
						-23.04	0.01521	-
12/3/2018	1812198-1	HW-G(S)	-6.74	0.20	-	-38.19	0.01498	-
			-6.93	0.20	-	-37.87	0.01498	-
	1812198-2	HW-G(M)	-7.53	0.20	-	-44.34	0.01498	-
			-7.57	0.20	-	-44.39	0.01498	-
	1812198-3	HW-G(D)	-7.18	0.20	-	-44.15	0.01489	-
			-7.45	0.20	-	-44.56	0.01488	-
	1812198-4	OW-9S	-7.29	0.20	-	-41.86	0.01492	-
			-7.41	0.20	-	-42.94	0.0149	-
	1812198-5	OW-9D	-7.76	0.20	-	-47.91	0.01483	-
			-7.71	0.20	-	-46.82	0.01484	-
					-	-47.20	0.01484	-
			1812198-6	OW-9DD	-7.52	0.20	-	-45.58
	-7.57	0.20			-	-45.48	0.01487	-
	1812198-7	OW-9M	-7.13	0.20	-	-41.44	0.01493	-
			-7.24	0.20	-	-43.40	0.0149	-
-7.58						0.20	-	-49.29
12/7/2018	1812232-1	OW-18S	-7.54	0.20	-	-49.66	0.0148	-
			-6.95	0.20	-	-42.64	0.01491	-
	1812232-2	OW-18M	-6.89	0.20	-	-42.57	0.01491	-
			-7.28	0.20	-	-44.76	0.01488	*
	1812232-3	OW-18D	-7.36	0.20	-	-41.61	0.01493	*
			IAEA OH-14	-	-5.64	0.20	-5.6	-37.45
QA/QC	IAEA OH-15	-	-9.59	0.20	-9.41	-77.89	0.01436	-78
	IAEA OH-16	-	-15.72	0.20	-15.41	-	-	-113.8
	Antarc IC	-	-29.83	0.19	-30	-	-	-239.69

Table 5. Fire Truck Spray Water Results for PFAS Compounds ug/L

	Fire Truck Spray Water Spray					
Sample ID	Hose	Roof	Bumper	Officer Side Handline	Driver side-Rear	Officer side-Rear
Sample Date						
Perfluoroheptanoic acid (PFHpA)	0.073	0.0045	0.0039	0.027	0.0055	0.081
Perfluorohexanesulfonic acid (PFHxS)	0.0059	0.0033	0.0039	0.004	0.0048	0.0043
Perfluorononanoic acid (PFNA)	0.011	0.0026	0.0031	0.013	0.003	0.016
Perfluorooctanoic acid (PFOA)	0.088	0.0087	0.01	0.039	0.011	0.076
Perfluorooctane sulfonate (PFOS)	0.009	0.0068	0.006	0.0087	0.0093	0.0086
Perfluorodecanoic Acid (PFDA)	0.014	0.004	0.0045	0.032	0.0049	0.032
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	<b>0.2009</b>	<b>0.0299</b>	<b>0.0314</b>	<b>0.1237</b>	<b>0.0385</b>	<b>0.2179</b>

Notes:

< = Not detected by the laboratory above the reporting limit. Reporting limit shown.

Results in ug/L, micrograms per liter.

Bold results above proposed MassDEP GW-1 standard (0.02 ug/L)

## APPENDIX A

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### Laboratory Analysis Reports

July 30, 2019

Bryan Massa  
Horsley Witten Group  
90 Route 6A Unit #1  
Sandwich, MA 02563

Project Location: Barnstable Airport  
Client Job Number:  
Project Number: 17027  
Laboratory Work Order Number: 19F1642

Enclosed are results of analyses for samples received by the laboratory on June 29, 2019. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "R J McCarthy", is displayed on a light gray rectangular background.

Raymond J. McCarthy  
Project Manager

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39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Horsley Witten Group  
90 Route 6A Unit #1  
Sandwich, MA 02563  
ATTN: Bryan Massa

REPORT DATE: 7/30/2019

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 17027

**ANALYTICAL SUMMARY**

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WORK ORDER NUMBER: 19F1642

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Barnstable Airport

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
HW-L	19F1642-01	Ground Water		SOP 434-PFAAS	
HW-K	19F1642-02	Ground Water		SOP 434-PFAAS	
HW-I (m)	19F1642-03	Ground Water		SOP 434-PFAAS	
HW-I (d)	19F1642-04	Ground Water		SOP 434-PFAAS	
HW-M	19F1642-05	Ground Water		SOP 434-PFAAS	
HW-D (d)	19F1642-06	Ground Water		SOP 434-PFAAS	
HW-D (dd)	19F1642-07	Ground Water		SOP 434-PFAAS	
HW-N	19F1642-08	Ground Water		SOP 434-PFAAS	

**CASE NARRATIVE SUMMARY**

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

**SOP 434-PFAAS****Qualifications:****L-05**

Laboratory fortified blank/laboratory control sample recovery is outside of control limits. Reported value for this compound is likely to be biased on the high side.

**Analyte & Samples(s) Qualified:****6:2 Fluorotelomersulfonate (6:2 FT)**

B235081-BS1

**S-26**

Surrogate outside of control limits.

**Analyte & Samples(s) Qualified:****13C-PFDA**

19F1642-01[HW-L], 19F1642-02[HW-K], 19F1642-04[HW-I (d)], 19F1642-05[HW-M], 19F1642-06[HW-D (d)]

**d5-NEtFOSAA**

19F1642-01[HW-L], 19F1642-02[HW-K], 19F1642-03[HW-I (m)], 19F1642-04[HW-I (d)], 19F1642-05[HW-M], 19F1642-06[HW-D (d)]

**V-17**

Internal standard area <50% of associated calibration standard internal standard area. Reanalysis yielded similar internal standard non-conformance.

**Analyte & Samples(s) Qualified:****13C-PFOS**

19F1642-04[HW-I (d)]

**d3-NMeFOSAA**

19F1642-01[HW-L], 19F1642-04[HW-I (d)], 19F1642-05[HW-M], 19F1642-06[HW-D (d)]

**V-20**

Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

**Analyte & Samples(s) Qualified:****6:2 Fluorotelomersulfonate (6:2 FT)**

S038553-CCV1, S038553-CCV2, S038597-CCV1

**Z-01**

Sample could not be re-extracted due to hold time.

**Analyte & Samples(s) Qualified:**

19F1642-01[HW-L], 19F1642-02[HW-K], 19F1642-03[HW-I (m)], 19F1642-04[HW-I (d)], 19F1642-05[HW-M], 19F1642-06[HW-D (d)]

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.

I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

A handwritten signature in black ink, reading "Tod Kopyscinski". The signature is written in a cursive style with a large, stylized "T" and "K".

Tod E. Kopyscinski  
Laboratory Director

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19F1642

Date Received: 6/29/2019

Field Sample #: HW-L

Sampled: 6/19/2019 10:46

Sample ID: 19F1642-01

Sample Matrix: Ground Water

Sample Flags: Z-01

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanesulfonic acid (PFBS)	8.2	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluorohexanoic acid (PFHxA)	19	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluoroheptanoic acid (PFHpA)	7.8	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluorobutanoic acid (PFBA)	6.6	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluoroheptanesulfonic acid (PFHpS)	2.2	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluoropentanoic acid (PFPeA)	23	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
6:2 Fluorotelomersulfonate (6:2 FTS)	2.1	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluorohexanesulfonic acid (PFHxS)	33	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluorooctanoic acid (PFOA)	25	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluorooctanesulfonic acid (PFOS)	49	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluorononanoic acid (PFNA)	3.3	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
N-EtFOSAA	3.1	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:18	BLM

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	111	70-130		7/27/19 21:18
13C-PFDA	21.9 *	70-130	S-26	7/27/19 21:18
d5-NEtFOSAA	12.2 *	70-130	S-26	7/27/19 21:18

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19F1642

Date Received: 6/29/2019

Field Sample #: HW-K

Sampled: 6/19/2019 11:56

Sample ID: 19F1642-02

Sample Matrix: Ground Water

Sample Flags: Z-01

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluorohexanoic acid (PFHxA)	11	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluoroheptanoic acid (PFHpA)	5.1	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluorobutanoic acid (PFBA)	5.5	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluoropentanoic acid (PFPeA)	19	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
6:2 Fluorotelomersulfonate (6:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluorooctanoic acid (PFOA)	4.1	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
N-EtFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:30	BLM
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
13C-PFHxA	98.1		70-130				7/27/19 21:30		
13C-PFDA	55.0 *		70-130		S-26		7/27/19 21:30		
d5-NEtFOSAA	58.4 *		70-130		S-26		7/27/19 21:30		

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19F1642

Date Received: 6/29/2019

Field Sample #: HW-1 (m)

Sampled: 6/24/2019 12:59

Sample ID: 19F1642-03

Sample Matrix: Ground Water

Sample Flags: Z-01

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluorohexanoic acid (PFHxA)	14	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluoroheptanoic acid (PFHpA)	3.2	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluorobutanoic acid (PFBA)	5.6	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluoropentanoic acid (PFPeA)	9.9	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
6:2 Fluorotelomersulfonate (6:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluorohexanesulfonic acid (PFHxS)	19	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluorooctanoic acid (PFOA)	6.1	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluorooctanesulfonic acid (PFOS)	14	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
N-EtFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:43	BLM
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
13C-PFHxA	126		70-130				7/27/19 21:43		
13C-PFDA	70.1		70-130				7/27/19 21:43		
d5-NEtFOSAA	56.9 *		70-130		S-26		7/27/19 21:43		

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19F1642

Date Received: 6/29/2019

Field Sample #: HW-1 (d)

Sampled: 6/24/2019 13:33

Sample ID: 19F1642-04

Sample Matrix: Ground Water

Sample Flags: Z-01

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanesulfonic acid (PFBS)	12	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluorohexanoic acid (PFHxA)	16	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluoroheptanoic acid (PFHpA)	5.3	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluorobutanoic acid (PFBA)	9.7	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluoroheptanesulfonic acid (PFHpS)	2.0	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluoropentanoic acid (PFPeA)	18	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
6:2 Fluorotelomersulfonate (6:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluorohexanesulfonic acid (PFHxS)	57	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluorooctanoic acid (PFOA)	4.7	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluorooctanesulfonic acid (PFOS)	12	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
N-EtFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 21:56	BLM
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
13C-PFHxA	128		70-130					7/27/19 21:56	
13C-PFDA	7.87	*	70-130		S-26			7/27/19 21:56	
d5-NEtFOSAA	24.3	*	70-130		S-26			7/27/19 21:56	

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19F1642

Date Received: 6/29/2019

Field Sample #: HW-M

Sampled: 6/24/2019 15:44

Sample ID: 19F1642-05

Sample Matrix: Ground Water

Sample Flags: Z-01

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanesulfonic acid (PFBS)	5.6	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluorohexanoic acid (PFHxA)	12	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluoroheptanoic acid (PFHpA)	7.0	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluorobutanoic acid (PFBA)	5.7	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluoropentanoic acid (PFPeA)	7.7	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
6:2 Fluorotelomersulfonate (6:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluorohexanesulfonic acid (PFHxS)	16	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluorooctanoic acid (PFOA)	27	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluorooctanesulfonic acid (PFOS)	7.4	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
N-EtFOSAA	4.3	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:08	BLM
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
13C-PFHxA	97.1		70-130				7/27/19 22:08		
13C-PFDA	31.2 *		70-130		S-26		7/27/19 22:08		
d5-NEtFOSAA	34.8 *		70-130		S-26		7/27/19 22:08		



39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19F1642

Date Received: 6/29/2019

Field Sample #: HW-D (d)

Sampled: 6/24/2019 10:53

Sample ID: 19F1642-06

Sample Matrix: Ground Water

Sample Flags: Z-01

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanesulfonic acid (PFBS)	9.7	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluorohexanoic acid (PFHxA)	25	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluoroheptanoic acid (PFHpA)	21	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluorobutanoic acid (PFBA)	6.7	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluoroheptanesulfonic acid (PFHpS)	3.8	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluoropentanoic acid (PFPeA)	25	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
6:2 Fluorotelomersulfonate (6:2 FTS)	2.2	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluorohexanesulfonic acid (PFHxS)	62	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluorooctanoic acid (PFOA)	8.8	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluorooctanesulfonic acid (PFOS)	95	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluorononanoic acid (PFNA)	15	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
N-EtFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Perfluorotetradecanoic acid (PFTA)	2.6	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:21	BLM
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
13C-PFHxA	113		70-130					7/27/19 22:21	
13C-PFDA	27.6	*	70-130		S-26			7/27/19 22:21	
d5-NEtFOSAA	31.5	*	70-130		S-26			7/27/19 22:21	

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19F1642

Date Received: 6/29/2019

Field Sample #: HW-D (dd)

Sampled: 6/24/2019 11:52

Sample ID: 19F1642-07

Sample Matrix: Ground Water

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
6:2 Fluorotelomersulfonate (6:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluorohexanesulfonic acid (PFHxS)	9.2	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluorooctanesulfonic acid (PFOS)	13	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluorononanoic acid (PFNA)	4.1	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
N-EtFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:33	BLM
Surrogates	% Recovery	Recovery Limits	Flag/Qual						
13C-PFHxA	118	70-130							
13C-PFDA	90.6	70-130							
d5-NEtFOSAA	82.8	70-130							

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19F1642

Date Received: 6/29/2019

Field Sample #: HW-N

Sampled: 6/24/2019 15:10

Sample ID: 19F1642-08

Sample Matrix: Ground Water

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanesulfonic acid (PFBS)	5.4	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluorohexanoic acid (PFHxA)	7.1	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluoroheptanoic acid (PFHpA)	3.4	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluoropentanoic acid (PFPeA)	11	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
6:2 Fluorotelomersulfonate (6:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluorohexanesulfonic acid (PFHxS)	33	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluorooctanoic acid (PFOA)	8.8	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluorooctanesulfonic acid (PFOS)	4.0	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
N-EtFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/3/19	7/27/19 22:46	BLM
Surrogates	% Recovery	Recovery Limits	Flag/Qual						
13C-PFHxA	110	70-130							
13C-PFDA	102	70-130							
d5-NEtFOSAA	79.7	70-130							

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39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332**Sample Extraction Data****Prep Method: SOP 434-PFAAS-SOP 434-PFAAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
19F1642-01 [HW-L]	B235081	250	1.00	07/03/19
19F1642-02 [HW-K]	B235081	250	1.00	07/03/19
19F1642-03 [HW-I (m)]	B235081	250	1.00	07/03/19
19F1642-04 [HW-I (d)]	B235081	250	1.00	07/03/19
19F1642-05 [HW-M]	B235081	250	1.00	07/03/19
19F1642-06 [HW-D (d)]	B235081	250	1.00	07/03/19
19F1642-07 [HW-D (dd)]	B235081	250	1.00	07/03/19
19F1642-08 [HW-N]	B235081	250	1.00	07/03/19

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

## QUALITY CONTROL

## Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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## Batch B235081 - SOP 434-PFAAS

## Blank (B235081-BLK1)

Prepared: 07/03/19 Analyzed: 07/27/19

Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L							
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L							
6:2 Fluorotelomersulfonate (6:2 FTS)	ND	2.0	ng/L							
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	2.0	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L							
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L							
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L							
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L							
N-MeFOSAA	ND	2.0	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L							
N-EtFOSAA	ND	2.0	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L							
Surrogate: 13C-PFHxA	48.2		ng/L	40.0		120	70-130			
Surrogate: 13C-PFDA	43.8		ng/L	40.0		110	70-130			
Surrogate: d5-NEtFOSAA	182		ng/L	160		114	70-130			

## LCS (B235081-BS1)

Prepared: 07/03/19 Analyzed: 07/27/19

Perfluorobutanesulfonic acid (PFBS)	1.81	2.0	ng/L	1.77		102	50-150			
Perfluorohexanoic acid (PFHxA)	2.38	2.0	ng/L	2.00		119	50-150			
Perfluoroheptanoic acid (PFHpA)	1.60	2.0	ng/L	2.00		80.0	50-150			
Perfluorobutanoic acid (PFBA)	2.95	2.0	ng/L	2.00		148	50-150			
Perfluorodecanesulfonic acid (PFDS)	2.57	2.0	ng/L	1.93		133	50-150			
Perfluoroheptanesulfonic acid (PFHpS)	1.68	2.0	ng/L	1.90		88.3	50-150			
Perfluorooctanesulfonamide (FOSA)	1.93	2.0	ng/L	2.00		96.3	50-150			
Perfluoropentanoic acid (PFPeA)	1.89	2.0	ng/L	2.00		94.5	50-150			
6:2 Fluorotelomersulfonate (6:2 FTS)	5.04	2.0	ng/L	1.90		265 *	50-150			L-05
8:2 Fluorotelomersulfonate (8:2 FTS)	2.32	2.0	ng/L	1.92		121	50-150			
Perfluorohexanesulfonic acid (PFHxS)	1.89	2.0	ng/L	1.82		104	50-150			
Perfluorooctanoic acid (PFOA)	2.27	2.0	ng/L	2.00		114	50-150			
Perfluorooctanesulfonic acid (PFOS)	1.94	2.0	ng/L	1.85		105	50-150			
Perfluorononanoic acid (PFNA)	2.09	2.0	ng/L	2.00		105	50-150			
Perfluorodecanoic acid (PFDA)	2.09	2.0	ng/L	2.00		104	50-150			
N-MeFOSAA	1.40	2.0	ng/L	2.00		69.9	50-150			
Perfluoroundecanoic acid (PFUnA)	2.22	2.0	ng/L	2.00		111	50-150			
N-EtFOSAA	1.63	2.0	ng/L	2.00		81.7	50-150			
Perfluorododecanoic acid (PFDoA)	2.34	2.0	ng/L	2.00		117	50-150			
Perfluorotridecanoic acid (PFTrDA)	2.61	2.0	ng/L	2.00		130	50-150			
Perfluorotetradecanoic acid (PFTA)	1.50	2.0	ng/L	2.00		75.2	50-150			
Surrogate: 13C-PFHxA	44.2		ng/L	40.0		111	70-130			
Surrogate: 13C-PFDA	36.6		ng/L	40.0		91.5	70-130			
Surrogate: d5-NEtFOSAA	143		ng/L	160		89.5	70-130			

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39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332**FLAG/QUALIFIER SUMMARY**

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
L-05	Laboratory fortified blank/laboratory control sample recovery is outside of control limits. Reported value for this compound is likely to be biased on the high side.
S-26	Surrogate outside of control limits.
V-17	Internal standard area <50% of associated calibration standard internal standard area. Reanalysis yielded similar internal standard non-conformance.
V-20	Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.
X-03	Sample container was broken when received.
Z-01	Sample could not be re-extracted due to hold time.

# CERTIFICATIONS

## Certified Analyses included in this Report

Analyte	Certifications
<b>SOP 434-PFAAS in Water</b>	
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorobutanoic acid (PFBA)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
6:2 Fluorotelomersulfonate (6:2 FTS)	NH-P
8:2 Fluorotelomersulfonate (8:2 FTS)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-MeFOSAA	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-EtFOSAA	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	03/1/2020
MA	Massachusetts DEP	M-MA100	06/30/2020
CT	Connecticut Department of Public Health	PH-0567	09/30/2019
NY	New York State Department of Health	10899 NELAP	04/1/2020
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2020
RI	Rhode Island Department of Health	LAO00112	12/30/2019
NC	North Carolina Div. of Water Quality	652	12/31/2019
NJ	New Jersey DEP	MA007 NELAP	06/30/2020
FL	Florida Department of Health	E871027 NELAP	06/30/2020
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2020
ME	State of Maine	2011028	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2019
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2019
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2020
NC-DW	North Carolina Department of Health	25703	07/31/2019
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2020

## CHAIN OF CUSTODY RECORD

39 Spruce Street  
East Longmeadow, MA 01028

Page 1 of 1



Phone: 413-525-2332

Fax: 413-525-6405

Email: info@contestlabs.com

Company Name: **HORSLEY WITEN GROUP**Address: **90 ROUTE 6A**Phone: **508-833-6600**Project Name: **BARNSTABLE AIRPORT**Project Location: **BARNSTABLE AIRPORT**Project Number: **17027**Project Manager: **RJ MCCARTHY**

Con-Test Quote Name/Number:

Invoice Recipient: **BRYAN MASSA**Sampled By: **JOSEPHINE IBANEZ**

7-Day	<input checked="" type="checkbox"/>	10-Day	<input type="checkbox"/>
Due Date:			
1-Day	<input type="checkbox"/>	3-Day	<input type="checkbox"/>
2-Day	<input type="checkbox"/>	4-Day	<input type="checkbox"/>
Rush-Approval Required			
Data Delivery			
Format:	PDF	EXCEL	<input checked="" type="checkbox"/>
Other:			
CLP Like Data Pkg Required:	<input type="checkbox"/>		
Email To:	jibanez@hwskywriting.com		
Fax To #:			

Con-Test Work Order #	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	Composite	Grab	Matrix Code	Conc Code
1	HW-L	6/19/19 10:40	6/19/19 10:40		X	GW	U
2	HW-K	6/19/19 11:50	6/19/19 11:50				
3	HW-I (m)	6/19/19 12:59	6/19/19 12:59				
4	HW-I (d)	6/19/19 13:33	6/19/19 13:33				
5	HW-M	6/19/19 15:44	6/19/19 15:44				
6	HW-D (d)	6/19/19 10:53	6/19/19 10:53				
7	HW-D (dd)	6/19/19 11:52	6/19/19 11:52				
8	HW-N	6/19/19 15:10	6/19/19 15:10		X		X
	HW-O	6/19/19 11:14	6/19/19 11:14		X		X

Comments:

Field blank collected 6/24/19 10:50  
HW-O sample was silty  
Disregard HW-O (crossed out).

Relinquished by: (signature)

Received by: (signature)

Relinquished by: (signature)

Relinquished by: (signature)

Relinquished by: (signature)

Relinquished by: (signature)

Relinquished by: (signature)

Relinquished by: (signature)

Relinquished by: (signature)

Relinquished by: (signature)

Relinquished by: (signature)

Relinquished by: (signature)

Relinquished by: (signature)

Relinquished by: (signature)

Please use the following codes to indicate possible sample concentration within the Conc Code column above:

H - High; M - Medium; L - Low; C - Clean; U - Unknown

Detection Limit Requirements	Special Requirements
MA	MA MCP Required
	MCP Certification Form Required
CT	CT RCP Required
	RCP Certification Form Required
Other	MA State DW Required
PWSID #	



NELAP and AIHA-LAP, LLC Accredited

Project Entity

Government ☐ Municipality ☐ MWRA ☐ Other ☐

Federal ☐ 21 J ☐ School ☐ Chromatogram ☐

City ☐ Brownfield ☐ MBTA ☐ AIHA-LAP, LLC ☐

Date/Time: 6/24/19 18:20

Date/Time: 6/24/19 18:20

Date/Time: 6/28/19

Date/Time: 6/20/19 10:25

Date/Time:

Date/Time:





775593027921



Delivered  
Saturday 6/29/2019 at 10:25 am

**DELIVERED**

Signed for by: M.PROSPECT

**GET STATUS UPDATES****OBTAIN PROOF OF DELIVERY****FROM**

SANDWICH, MA US  
Origin Terminal  
WEST YARMOUTH, MA

**TO**

EAST LONGMEADOW, MA US  
Destination Location  
WINDSOR LOCKS, CT

**Shipment Facts****TRACKING NUMBER**

775593027921

**SERVICE**

FedEx Priority Overnight

**WEIGHT**

8 lbs / 3.63 kgs

**DIMENSIONS**

17x12x15 in.

**DELIVERED TO**

Shipping/Receiving

**TOTAL PIECES**

1

**TOTAL SHIPMENT WEIGHT**

8 lbs / 3.63 kgs

**TERMS**

Third Party

**SHIPPER REFERENCE**

Josephine

**PACKAGING**

Your Packaging

**SPECIAL HANDLING SECTION**

Saturday Delivery, Additional Handling  
Surcharge

**STANDARD TRANSIT**

6/29/2019 by 12:00 pm

**SHIP DATE**

Fri 6/28/2019

**ACTUAL DELIVERY**

Sat 6/29/2019 10:25 am

**Travel History**

Local Scan Time



Saturday, 6/29/2019

10:25 am

EAST LONGMEADOW, MA

Delivered

8:13 am

WINDSOR LOCKS, CT

On FedEx vehicle for delivery

I Have Not Confirmed Sample Container Numbers With Lab Staff Before Relinquishing Over Samples \_\_\_\_\_



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ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client Horsley Witten Corp  
 Received By RAP Date 6/20/19 Time 1025

How were the samples received? In Cooler T No Cooler \_\_\_\_\_ On Ice T No Ice \_\_\_\_\_  
 Direct from Sampling \_\_\_\_\_ Ambient \_\_\_\_\_ Melted Ice \_\_\_\_\_

Were samples within Temperature? 2-6°C T By Gun # 4 Actual Temp - 3.5  
 By Blank # \_\_\_\_\_ Actual Temp - \_\_\_\_\_

Was Custody Seal Intact? T Were Samples Tapered with? F  
 Was COC Relinquished? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T  
 Did COC include all Client T Analysis T Sampler Name T  
 pertinent Information? Project T ID's T Collection Dates/Times T

Are Sample labels filled out and legible? T  
 Are there Lab to Filters? F Who was notified? \_\_\_\_\_  
 Are there Rushes? F Who was notified? \_\_\_\_\_  
 Are there Short Holds? F Who was notified? \_\_\_\_\_

Is there enough Volume? T  
 Is there Headspace where applicable? F MS/MSD? F  
 Proper Media/Containers Used? T Is splitting samples required? F  
 Were trip blanks received? F On COC? F

Do all samples have the proper pH? MA Acid \_\_\_\_\_ Base \_\_\_\_\_

Vials	#	Containers:	#	#	#	#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.
HCL-	<u>4</u>	500 mL Amb.		500 mL Plastic		8oz Amb/Clear
Meoh-		250 mL Amb.		250 mL Plastic	<u>17</u>	4oz Amb/Clear
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear
DI-		Other Glass		Other Plastic		Encore
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:
Sulfuric-		Perchlorate		Ziplock		

#### Unused Media

Vials	#	Containers:	#	#	#	#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear
DI-		Other Plastic		Other Glass		Encore
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:
Sulfuric-		Perchlorate		Ziplock		

Comments:

July 29, 2019

Bryan Massa  
Horsley Witten Group  
90 Route 6A Unit #1  
Sandwich, MA 02563

Project Location: Barnstable Airport  
Client Job Number:  
Project Number: 17027  
Laboratory Work Order Number: 19G0295

Enclosed are results of analyses for samples received by the laboratory on July 8, 2019. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "R J McCarthy", is displayed within a light gray rectangular box.

Raymond J. McCarthy  
Project Manager

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39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Horsley Witten Group  
90 Route 6A Unit #1  
Sandwich, MA 02563  
ATTN: Bryan Massa

REPORT DATE: 7/29/2019

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 17027

#### ANALYTICAL SUMMARY

---

WORK ORDER NUMBER: 19G0295

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Barnstable Airport

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
HW-O	19G0295-01	Ground Water		SOP 434-PFAAS	

**CASE NARRATIVE SUMMARY**

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

**SOP 434-PFAAS****Qualifications:****L-05**

Laboratory fortified blank/laboratory control sample recovery is outside of control limits. Reported value for this compound is likely to be biased on the high side.

**Analyte & Samples(s) Qualified:****8:2 Fluorotelomersulfonate (8:2 FT)**

B235286-BS1

**S-07**

One associated surrogate standard recovery is outside of control limits but the other(s) is/are within limits. All recoveries are > 10%.

**Analyte & Samples(s) Qualified:****d5-NEtFOSAA**

19G0295-01[HW-O]

**V-20**

Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

**Analyte & Samples(s) Qualified:****N-McFOSAA**

S038498-CCV1

**Perfluorooctanesulfonamide (FOS/**

S038498-CCV3

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.

I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.



Tod E. Kopycinski  
Laboratory Director

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19G0295

Date Received: 7/8/2019

Field Sample #: HW-O

Sampled: 7/2/2019 12:48

Sample ID: 19G0295-01

Sample Matrix: Ground Water

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanesulfonic acid (PFBS)	6.2	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluorohexanoic acid (PFHxA)	6.5	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluoropentanoic acid (PFPeA)	9.7	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
6:2 Fluorotelomersulfonate (6:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluorohexanesulfonic acid (PFHxS)	4.3	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluorooctanoic acid (PFOA)	3.9	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluorooctanesulfonic acid (PFOS)	17	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluorodecanoic acid (PFDA)	2.1	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
N-EtFOSAA	8.8	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	7/11/19	7/25/19 16:48	ZZZ
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
13C-PFHxA	118		70-130				7/25/19 16:48		
13C-PFDA	72.4		70-130				7/25/19 16:48		
d5-NEtFOSAA	31.3 *		70-130		S-07		7/25/19 16:48		

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**Sample Extraction Data**

**Prep Method: SOP 434-PFAAS-SOP 434-PFAAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
19G0295-01 [HW-O]	B235286	250	1.00	07/11/19



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## QUALITY CONTROL

## Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B235286 - SOP 434-PFAAS</b>										
<b>Blank (B235286-BLK1)</b>										
Prepared: 07/11/19 Analyzed: 07/25/19										
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L							
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L							
6:2 Fluorotelomersulfonate (6:2 FTS)	ND	2.0	ng/L							
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	2.0	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L							
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L							
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L							
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L							
N-MeFOSAA	ND	2.0	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L							
N-EtFOSAA	ND	2.0	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L							
Surrogate: 13C-PFHxA	44.1		ng/L	40.0		110	70-130			
Surrogate: 13C-PFDA	28.3		ng/L	40.0		70.6	70-130			
Surrogate: d5-NEtFOSAA	165		ng/L	160		103	70-130			
<b>LCS (B235286-BS1)</b>										
Prepared: 07/11/19 Analyzed: 07/29/19										
Perfluorobutanesulfonic acid (PFBS)	8.91	2.0	ng/L	8.85		101	50-150			
Perfluorohexanoic acid (PFHxA)	9.26	2.0	ng/L	10.0		92.6	50-150			
Perfluoroheptanoic acid (PFHpA)	9.78	2.0	ng/L	10.0		97.8	50-150			
Perfluorobutanoic acid (PFBA)	14.6	2.0	ng/L	10.0		146	50-150			
Perfluorodecanesulfonic acid (PFDS)	8.60	2.0	ng/L	9.65		89.1	50-150			
Perfluoroheptanesulfonic acid (PFHpS)	8.68	2.0	ng/L	9.50		91.3	50-150			
Perfluorooctanesulfonamide (FOSA)	8.34	2.0	ng/L	10.0		83.4	50-150			
Perfluoropentanoic acid (PFPeA)	12.8	2.0	ng/L	10.0		128	50-150			
6:2 Fluorotelomersulfonate (6:2 FTS)	8.52	2.0	ng/L	9.50		89.7	50-150			
<b>8:2 Fluorotelomersulfonate (8:2 FTS)</b>	14.6	2.0	ng/L	9.60		<b>152</b>	* 50-150			L-05
Perfluorohexanesulfonic acid (PFHxS)	8.69	2.0	ng/L	9.10		95.5	50-150			
Perfluorooctanoic acid (PFOA)	9.95	2.0	ng/L	10.0		99.5	50-150			
Perfluorooctanesulfonic acid (PFOS)	9.04	2.0	ng/L	9.25		97.7	50-150			
Perfluorononanoic acid (PFNA)	10.6	2.0	ng/L	10.0		106	50-150			
Perfluorodecanoic acid (PFDA)	9.68	2.0	ng/L	10.0		96.8	50-150			
N-MeFOSAA	9.56	2.0	ng/L	10.0		95.6	50-150			
Perfluoroundecanoic acid (PFUnA)	9.41	2.0	ng/L	10.0		94.1	50-150			
N-EtFOSAA	5.14	2.0	ng/L	10.0		51.4	50-150			
Perfluorododecanoic acid (PFDoA)	8.96	2.0	ng/L	10.0		89.6	50-150			
Perfluorotridecanoic acid (PFTrDA)	8.34	2.0	ng/L	10.0		83.4	50-150			
Perfluorotetradecanoic acid (PFTA)	9.11	2.0	ng/L	10.0		91.1	50-150			
Surrogate: 13C-PFHxA	43.9		ng/L	40.0		110	70-130			
Surrogate: 13C-PFDA	39.8		ng/L	40.0		99.6	70-130			
Surrogate: d5-NEtFOSAA	166		ng/L	160		104	70-130			

---

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**FLAG/QUALIFIER SUMMARY**

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
L-05	Laboratory fortified blank/laboratory control sample recovery is outside of control limits. Reported value for this compound is likely to be biased on the high side.
S-07	One associated surrogate standard recovery is outside of control limits but the other(s) is/are within limits. All recoveries are > 10%.
V-20	Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

**CERTIFICATIONS**
**Certified Analyses included in this Report**

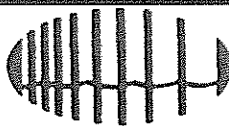
Analyte	Certifications
<b><i>SOP 434-PFAAS in Water</i></b>	
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorobutanoic acid (PFBA)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
6:2 Fluorotelomersulfonate (6:2 FTS)	NH-P
8:2 Fluorotelomersulfonate (8:2 FTS)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-MeFOSAA	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-EtFOSAA	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	03/1/2020
MA	Massachusetts DEP	M-MA100	06/30/2020
CT	Connecticut Department of Public Health	PH-0567	09/30/2019
NY	New York State Department of Health	10899 NELAP	04/1/2020
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2020
RI	Rhode Island Department of Health	LAO00112	12/30/2019
NC	North Carolina Div. of Water Quality	652	12/31/2019
NJ	New Jersey DEP	MA007 NELAP	06/30/2020
FL	Florida Department of Health	E871027 NELAP	06/30/2020
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2020
ME	State of Maine	2011028	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2019
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2019
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2020
NC-DW	North Carolina Department of Health	25703	07/31/2019
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2020



I Have Not Confirmed Sample Container  
Numbers With Lab Staff Before Relinquishing  
Over Samples \_\_\_\_\_



**con-test®**  
ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False  
Statement will be brought to the attention of the Client - State True or False

Client Horsley  
 Received By sp Date 7/8/19 Time 19:30

How were the samples received? In Cooler T No Cooler \_\_\_\_\_ On Ice T No Ice \_\_\_\_\_  
 Direct from Sampling \_\_\_\_\_ Ambient \_\_\_\_\_ Melted Ice \_\_\_\_\_

Were samples within Temperature? 2-6°C T By Gun # 4 Actual Temp - 2.1  
 By Blank # \_\_\_\_\_ Actual Temp - \_\_\_\_\_

Was Custody Seal Intact? N/A Were Samples Tampered with? N/A  
 Was COC Relinquished? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T  
 Did COC include all Client T Analysis T Sampler Name T  
 pertinent Information? Project T ID's T Collection Dates/Times T

Are Sample labels filled out and legible? T  
 Are there Lab to Filters? F Who was notified? \_\_\_\_\_  
 Are there Rushes? F Who was notified? \_\_\_\_\_  
 Are there Short Holds? F Who was notified? \_\_\_\_\_

Is there enough Volume? T  
 Is there Headspace where applicable? N/A MS/MSD? F  
 Proper Media/Containers Used? T Is splitting samples required? F  
 Were trip blanks received? F On COC? F  
 Do all samples have the proper pH? N/A Acid \_\_\_\_\_ Base \_\_\_\_\_

Vials	#	Containers:	#	#	#	#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear
Meoh-		250 mL Amb.		250 mL Plastic	<u>2</u>	4oz Amb/Clear
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear
DI-		Other Glass		Other Plastic		Encore
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:
Sulfuric-		Perchlorate		Ziplock		

#### Unused Media

Vials	#	Containers:	#	#	#	#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear
DI-		Other Plastic		Other Glass		Encore
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:
Sulfuric-		Perchlorate		Ziplock		

Comments:



*CERTIFICATE OF ANALYSIS*

Josphine Ibanez  
Horsley & Witten  
90 Route 6A  
Sandwich, MA 02563

**RE: Barn On-Call No. 4 (17027)**  
**ESS Laboratory Work Order Number: 19G0181**

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard  
Laboratory Director

**REVIEWED**

**By ESS Laboratory at 3:52 pm, Jul 15, 2019**

**Analytical Summary**

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4

ESS Laboratory Work Order: 19G0181

**SAMPLE RECEIPT**

The following samples were received on July 08, 2019 for the analyses specified on the enclosed Chain of Custody Record.

**Question I: All samples for SVOC were analyzed for a subset of the required MCP list per the client's request.**

<u>Lab Number</u>	<u>Sample Name</u>	<u>Matrix</u>	<u>Analysis</u>
19G0181-01	HW-L	Ground Water	8270D SIM



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4

ESS Laboratory Work Order: 19G0181

**PROJECT NARRATIVE**

**8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution**  
C9G0269-TUN1 [Benzidine tailing factor >2.](#)

**No other observations noted.**

**End of Project Narrative.**

**DATA USABILITY LINKS**

*To ensure you are viewing the most current version of the documents below, please clear your internet cookies for [www.ESSLaboratory.com](http://www.ESSLaboratory.com). Consult your IT Support personnel for information on how to clear your internet cookies.*

[Definitions of Quality Control Parameters](#)

[Semivolatile Organics Internal Standard Information](#)

[Semivolatile Organics Surrogate Information](#)

[Volatile Organics Internal Standard Information](#)

[Volatile Organics Surrogate Information](#)

[EPH and VPH Alkane Lists](#)





*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4

ESS Laboratory Work Order: 19G0181

**CURRENT SW-846 METHODOLOGY VERSIONS**

**Analytical Methods**

1010A - Flashpoint  
6010C - ICP  
6020A - ICP MS  
7010 - Graphite Furnace  
7196A - Hexavalent Chromium  
7470A - Aqueous Mercury  
7471B - Solid Mercury  
8011 - EDB/DBCP/TCP  
8015C - GRO/DRO  
8081B - Pesticides  
8082A - PCB  
8100M - TPH  
8151A - Herbicides  
8260B - VOA  
8270D - SVOA  
8270D SIM - SVOA Low Level  
9014 - Cyanide  
9038 - Sulfate  
9040C - Aqueous pH  
9045D - Solid pH (Corrosivity)  
9050A - Specific Conductance  
9056A - Anions (IC)  
9060A - TOC  
9095B - Paint Filter  
MADEP 04-1.1 - EPH  
MADEP 18-2.1 - VPH

**Prep Methods**

3005A - Aqueous ICP Digestion  
3020A - Aqueous Graphite Furnace / ICP MS Digestion  
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion  
3060A - Solid Hexavalent Chromium Digestion  
3510C - Separatory Funnel Extraction  
3520C - Liquid / Liquid Extraction  
3540C - Manual Soxhlet Extraction  
3541 - Automated Soxhlet Extraction  
3546 - Microwave Extraction  
3580A - Waste Dilution  
5030B - Aqueous Purge and Trap  
5030C - Aqueous Purge and Trap  
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4  
Client Sample ID: HW-L  
Date Sampled: 07/02/19 11:00  
Percent Solids: N/A  
Initial Volume: 500  
Final Volume: 0.5  
Extraction Method: 3535A

ESS Laboratory Work Order: 19G0181  
ESS Laboratory Sample ID: 19G0181-01  
Sample Matrix: Ground Water  
Units: ug/L  
Analyst: VSC  
Prepared: 7/8/19 20:35

**8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,4-Dioxane	0.727 (0.250)		8270D SIM		1	07/15/19 13:37	C9G0269	CG90846
<hr/>								
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
Surrogate: 1,4-Dioxane-d8		45 %		15-115				



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4

ESS Laboratory Work Order: 19G0181

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

**Batch CG90846 - 3535A**

**Blank**

1,4-Dioxane	ND	0.250	ug/L							
Surrogate: 1,4-Dioxane-d8	3.02		ug/L	5.000		60	15-115			

**LCS**

1,4-Dioxane	11.1	0.250	ug/L	10.00		111	40-140			
Surrogate: 1,4-Dioxane-d8	2.66		ug/L	5.000		53	15-115			

**LCS Dup**

1,4-Dioxane	10.4	0.250	ug/L	10.00		104	40-140	7	20	
Surrogate: 1,4-Dioxane-d8	3.27		ug/L	5.000		65	15-115			



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4

ESS Laboratory Work Order: 19G0181

**Notes and Definitions**

U	Analyte included in the analysis, but not detected
BT	Benzidine tailing factor >2.
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probably Number
TNTC	Too numerous to Count
CFU	Colony Forming Units



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4

ESS Laboratory Work Order: 19G0181

**ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS**

**ENVIRONMENTAL**

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

[http://www.ct.gov/dph/lib/dph/environmental\\_health/environmental\\_laboratories/pdf/OutOfStateCommercialLaboratories.pdf](http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf)

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml>

Massachusetts Potable and Non Potable Water: M-RI002

<http://public.dep.state.ma.us/Labcert/Labcert.aspx>

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

[http://datamine2.state.nj.us/DEP\\_OPRA/OpraMain/pi\\_main?mode=pi\\_by\\_site&sort\\_order=PI\\_NAMEA&Select+a+Site:=58715](http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715)

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

<http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx>

## ESS Laboratory Sample and Cooler Receipt Checklist

Client: Horsley Witten Group - KPB/HDM

ESS Project ID: 19G0181

Date Received: 7/8/2019

Project Due Date: 7/15/2019

Days for Project: 5 Day

Shipped/Delivered Via: ESS Courier

1. Air bill manifest present? ☐ No  
Air No.: NA

6. Does COC match bottles? ☐ Yes

2. Were custody seals present? ☐ No

7. Is COC complete and correct? ☐ Yes

3. Is radiation count <100 CPM? ☐ Yes

8. Were samples received intact? ☐ Yes

4. Is a Cooler Present? ☐ Yes

9. Were labs informed about short holds & rushes? ☒ Yes / No / NA

Temp: 0.8 Iced with: Ice

10. Were any analyses received outside of hold time? ☒ Yes / No

5. Was COC signed and dated by client? ☐ Yes

11. Any Subcontracting needed? Yes ☒ No

12. Were VOAs received? Yes ☒ No

ESS Sample IDs:

Analysis: \_\_\_\_\_

TAT: \_\_\_\_\_

a. Air bubbles in aqueous VOAs? Yes ☒ No

b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? ☒ Yes / No

a. If metals preserved upon receipt: Date: \_\_\_\_\_

b. Low Level VOA vials frozen: Date: \_\_\_\_\_

Time: \_\_\_\_\_ By: \_\_\_\_\_

Time: \_\_\_\_\_ By: \_\_\_\_\_

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes ☒ No

a. Was there a need to contact the client? Yes ☒ No

Who was contacted? \_\_\_\_\_ Date: \_\_\_\_\_

Time: \_\_\_\_\_ By: \_\_\_\_\_

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
01	362484	Yes	NA	Yes	1L Amber - Unpres	NP	
01	362485	Yes	NA	Yes	1L Amber - Unpres	NP	

### 2nd Review

Were all containers scanned into storage/lab?

Are barcode labels on correct containers?

Are all Flashpoint stickers attached/container ID # circled?

Are all Hex Chrome stickers attached?

Are all QC stickers attached?

Are VOA stickers attached if bubbles noted?

Initials GA

☒ Yes / No

Yes / No / NA

Yes / No / NA

Yes / No / NA

Yes / No / NA

Completed

By: [Signature]

Date & Time: 7/8/19 1649

Reviewed

By: [Signature]

Date & Time: 7/8/19 1850

Delivered

By: [Signature]

Date & Time: 7/8/19 1850



July 29, 2019

Bryan Massa  
Horsley Witten Group  
90 Route 6A Unit #1  
Sandwich, MA 02563

Project Location: Barnstable Airport  
Client Job Number:  
Project Number: [none]  
Laboratory Work Order Number: 19G0548

Enclosed are results of analyses for samples received by the laboratory on July 11, 2019. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "R J McCarthy", is displayed within a light gray rectangular box.

Raymond J. McCarthy  
Project Manager



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39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Horsley Witten Group  
90 Route 6A Unit #1  
Sandwich, MA 02563  
ATTN: Bryan Massa

REPORT DATE: 7/29/2019

PURCHASE ORDER NUMBER:

PROJECT NUMBER: [none]

**ANALYTICAL SUMMARY**

---

WORK ORDER NUMBER: 19G0548

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Barnstable Airport

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
LP-1	19G0548-01	Surface Water		SOP 434-PFAAS	
UGP-1	19G0548-02	Surface Water		SOP 434-PFAAS	

**CASE NARRATIVE SUMMARY**

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

**SOP 434-PFAAS****Qualifications:****DL-03**

Elevated reporting limit due to matrix interference.

**Analyte & Samples(s) Qualified:**

19G0548-01[LP-1], 19G0548-02[UGP-1]

**S-01**

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

**Analyte & Samples(s) Qualified:****13C-PFDA**

19G0548-02[UGP-1]

**13C-PFHxA**

19G0548-02[UGP-1]

**d5-NEtFOSAA**

19G0548-02[UGP-1]

**S-08**

Duplicate analysis confirmed surrogate failure due to matrix effects.

**Analyte & Samples(s) Qualified:****13C-PFDA**

19G0548-01[LP-1]

**d5-NEtFOSAA**

19G0548-01[LP-1]

**V-20**

Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

**Analyte & Samples(s) Qualified:****8:2 Fluorotelomersulfonate (8:2 FT)**

B235846-BS1

**Z-01**

Unable to re-extract due to holding times.

**Analyte & Samples(s) Qualified:**

19G0548-01[LP-1], 19G0548-02[UGP-1]

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.

I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

A handwritten signature in black ink, appearing to read "Tod Kopycinski". The signature is fluid and cursive, with the first name "Tod" being more prominent and the last name "Kopycinski" written in a continuous script.

Tod E. Kopycinski  
Laboratory Director

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19G0548

Date Received: 7/11/2019

Field Sample #: LP-1

Sampled: 7/11/2019 09:50

Sample ID: 19G0548-01

Sample Matrix: Surface Water

Sample Flags: DL-03, Z-01

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanesulfonic acid (PFBS)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluorohexanoic acid (PFHxA)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluoroheptanoic acid (PFHpA)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluorobutanoic acid (PFBA)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluorooctanesulfonamide (FOSA)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluoropentanoic acid (PFPeA)	18	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
6:2 Fluorotelomersulfonate (6:2 FTS)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluorohexanesulfonic acid (PFHxS)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluorooctanoic acid (PFOA)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluorooctanesulfonic acid (PFOS)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluorononanoic acid (PFNA)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluorodecanoic acid (PFDA)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
N-MeFOSAA	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluoroundecanoic acid (PFUnA)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
N-EtFOSAA	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluorododecanoic acid (PFDoA)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Perfluorotetradecanoic acid (PFTA)	ND	10	ng/L	5		SOP 434-PFAAS	7/18/19	7/28/19 4:27	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
13C-PFHxA	76.7		70-130				7/28/19 4:27		
13C-PFDA	21.3 *		70-130		S-08		7/28/19 4:27		
d5-NEtFOSAA	12.7 *		70-130		S-08		7/28/19 4:27		

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19G0548

Date Received: 7/11/2019

Field Sample #: UGP-1

Sampled: 7/11/2019 10:20

Sample ID: 19G0548-02

Sample Matrix: Surface Water

Sample Flags: DL-03, Z-01

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanesulfonic acid (PFBS)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluorohexanoic acid (PFHxA)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluoroheptanoic acid (PFHpA)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluorobutanoic acid (PFBA)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluorooctanesulfonamide (FOSA)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluoropentanoic acid (PFPeA)	47	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
6:2 Fluorotelomersulfonate (6:2 FTS)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluorohexanesulfonic acid (PFHxS)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluorooctanoic acid (PFOA)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluorooctanesulfonic acid (PFOS)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluorononanoic acid (PFNA)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluorodecanoic acid (PFDA)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
N-MeFOSAA	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluoroundecanoic acid (PFUnA)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
N-EtFOSAA	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluorododecanoic acid (PFDoA)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Perfluorotetradecanoic acid (PFTA)	ND	20	ng/L	10		SOP 434-PFAAS	7/18/19	7/28/19 4:40	JFC
Surrogates	% Recovery	Recovery Limits			Flag/Qual				
13C-PFHxA	*	70-130			S-01			7/28/19 4:40	
13C-PFDA	*	70-130			S-01			7/28/19 4:40	
d5-NEtFOSAA	*	70-130			S-01			7/28/19 4:40	

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**Sample Extraction Data**

**Prep Method: SOP 434-PFAAS-SOP 434-PFAAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
19G0548-01 [LP-1]	B235846	250	1.00	07/18/19
19G0548-02 [UGP-1]	B235846	250	1.00	07/18/19

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

## QUALITY CONTROL

## Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B235846 - SOP 434-PFAAS</b>										
<b>Blank (B235846-BLK1)</b>										
Prepared: 07/18/19 Analyzed: 07/27/19										
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L							
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L							
6:2 Fluorotelomersulfonate (6:2 FTS)	ND	2.0	ng/L							
8:2 Fluorotelomersulfonate (8:2 FTS)	ND	2.0	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L							
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L							
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L							
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L							
N-MeFOSAA	ND	2.0	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L							
N-EtFOSAA	ND	2.0	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L							
Surrogate: 13C-PFHxA	51.9		ng/L	40.0		130	70-130			
Surrogate: 13C-PFDA	40.9		ng/L	40.0		102	70-130			
Surrogate: d5-NEtFOSAA	172		ng/L	160		107	70-130			
<b>LCS (B235846-BS1)</b>										
Prepared: 07/18/19 Analyzed: 07/27/19										
Perfluorobutanesulfonic acid (PFBS)	19.3	2.0	ng/L	17.7		109	70-130			
Perfluorohexanoic acid (PFHxA)	19.2	2.0	ng/L	20.0		96.1	70-130			
Perfluoroheptanoic acid (PFHpA)	17.1	2.0	ng/L	20.0		85.3	70-130			
Perfluorobutanoic acid (PFBA)	24.9	2.0	ng/L	20.0		124	70-130			
Perfluorodecanesulfonic acid (PFDS)	17.6	2.0	ng/L	19.3		91.2	70-130			
Perfluoroheptanesulfonic acid (PFHpS)	18.6	2.0	ng/L	19.0		97.8	70-130			
Perfluorooctanesulfonamide (FOSA)	18.8	2.0	ng/L	20.0		94.0	70-130			
Perfluoropentanoic acid (PFPeA)	17.9	2.0	ng/L	20.0		89.7	70-130			
6:2 Fluorotelomersulfonate (6:2 FTS)	22.8	2.0	ng/L	19.0		120	70-130			
<b>8:2 Fluorotelomersulfonate (8:2 FTS)</b>	32.0	2.0	ng/L	19.2		<b>167</b> *	70-130			V-20
Perfluorohexanesulfonic acid (PFHxS)	17.2	2.0	ng/L	18.2		94.5	70-130			
Perfluorooctanoic acid (PFOA)	19.9	2.0	ng/L	20.0		99.6	70-130			
Perfluorooctanesulfonic acid (PFOS)	20.0	2.0	ng/L	18.5		108	70-130			
Perfluorononanoic acid (PFNA)	20.0	2.0	ng/L	20.0		99.8	70-130			
Perfluorodecanoic acid (PFDA)	18.2	2.0	ng/L	20.0		90.8	70-130			
N-MeFOSAA	22.5	2.0	ng/L	20.0		113	70-130			
Perfluoroundecanoic acid (PFUnA)	17.8	2.0	ng/L	20.0		89.0	70-130			
N-EtFOSAA	15.8	2.0	ng/L	20.0		79.0	70-130			
Perfluorododecanoic acid (PFDoA)	17.7	2.0	ng/L	20.0		88.5	70-130			
Perfluorotridecanoic acid (PFTrDA)	18.2	2.0	ng/L	20.0		90.8	70-130			
Perfluorotetradecanoic acid (PFTA)	17.0	2.0	ng/L	20.0		84.8	70-130			
Surrogate: 13C-PFHxA	45.9		ng/L	40.0		115	70-130			
Surrogate: 13C-PFDA	40.1		ng/L	40.0		100	70-130			
Surrogate: d5-NEtFOSAA	174		ng/L	160		109	70-130			



---

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332**FLAG/QUALIFIER SUMMARY**

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
DL-03	Elevated reporting limit due to matrix interference.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.
S-08	Duplicate analysis confirmed surrogate failure due to matrix effects.
V-20	Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side.
	Data validation is not affected since sample result was "not detected" for this compound.
Z-01	Unable to re-extract due to holding times.

# CERTIFICATIONS

## Certified Analyses included in this Report

Analyte	Certifications
<b>SOP 434-PFAAS in Water</b>	
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorobutanoic acid (PFBA)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
6:2 Fluorotelomersulfonate (6:2 FTS)	NH-P
8:2 Fluorotelomersulfonate (8:2 FTS)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-MeFOSAA	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-EtFOSAA	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	03/1/2020
MA	Massachusetts DEP	M-MA100	06/30/2020
CT	Connecticut Department of Public Health	PH-0567	09/30/2019
NY	New York State Department of Health	10899 NELAP	04/1/2020
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2020
RI	Rhode Island Department of Health	LAO00112	12/30/2019
NC	North Carolina Div. of Water Quality	652	12/31/2019
NJ	New Jersey DEP	MA007 NELAP	06/30/2020
FL	Florida Department of Health	E871027 NELAP	06/30/2020
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2020
ME	State of Maine	2011028	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2019
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2019
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2020
NC-DW	North Carolina Department of Health	25703	07/31/2019
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2020



Phone: 413-525-2332  
Fax: 413-525-6405

Address: 90 ROUTE 6A, UNIT 1, SANDWICH, MA 01903

Project Name: BARNSTABLE AIRPORT

Project Location: BARNSTABLE AIRPORT

Project Number: 17027

Project Manager: R. J. MCCARTHY

Con-Test Quote Name/Number:

Invoice Recipient: BRYAN MASSA

Sampled By:

Company Name: HORSLEY WITTEN GROUP

Address: 90 ROUTE 6A, UNIT 1, SANDWICH, MA 01903

Phone: 508-833-6600

Project Name: BARNSTABLE AIRPORT

Project Location: BARNSTABLE AIRPORT

Project Number: 17027

Project Manager: R. J. MCCARTHY

Con-Test Quote Name/Number:

Invoice Recipient: BRYAN MASSA

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Project Manager: R. J. MCCARTHY

Con-Test Quote Name/Number:

Invoice Recipient: BRYAN MASSA

Sampled By:

Company Name: HORSLEY WITTEN GROUP

Address: 90 ROUTE 6A, UNIT 1, SANDWICH, MA 01903

Phone: 508-833-6600

Project Name: BARNSTABLE AIRPORT

Project Location: BARNSTABLE AIRPORT

Project Number: 17027

http://www.contestlabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street  
East Longmeadow, MA 01028

Doc # 381 Rev 1\_03242017

Page 1 of 1

Company Name: HORSLEY WITTEN GROUP		Address: 90 ROUTE 6A, UNIT 1, SANDWICH, MA 01903		Phone: 508-833-6600		Project Name: BARNSTABLE AIRPORT		Project Location: BARNSTABLE AIRPORT		Project Number: 17027		Project Manager: R. J. MCCARTHY		Con-Test Quote Name/Number:		Invoice Recipient: BRYAN MASSA		Sampled By:	
Requested Turnaround Time	7-Day <input type="checkbox"/> 10-Day <input checked="" type="checkbox"/>	Due Date:		Rush Approval Required	1-Day <input type="checkbox"/> 3-Day <input type="checkbox"/>	2-Day <input type="checkbox"/> 4-Day <input type="checkbox"/>	Data Delivery	Format: PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/>	Other:	CLP Like Data Pkg Required: <input type="checkbox"/>	Email To: jibanez@hwskywitten.com	Fax To #:							
Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	Composite	Grab	Matrix Code	Conc Code												
1	LP-1	7/11/19 9:50	7/11/19 9:50		X	O	U												
2	UGP-1	7/11/19 10:20	7/11/19 10:20		X	O	U												
<p>1 Matrix Codes: GW = Ground Water WW = Waste Water DW = Drinking Water A = Air S = Soil SL = Sludge SOL = Solid O = Other (please define) <u>Surface Water</u></p> <p>2 Preservation Codes: I = Iced H = HCL M = Methanol N = Nitric Acid S = Sulfuric Acid B = Sodium Bisulfate X = Sodium Hydroxide T = Sodium Thiosulfate O = Other (please define)</p> <p>3 Container Codes: A = Amber Glass G = Glass P = Plastic ST = Sterile V = Vial S = Summa Canister T = Tedlar Bag O = Other (please define)</p> <p>PCB ONLY <input type="checkbox"/> Soxhlet <input type="checkbox"/> Non Soxhlet</p>																			

I Have Not Confirmed Sample Container  
Numbers With Lab Staff Before Relinquishing  
Over Samples \_\_\_\_\_



**con-test®**  
ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False  
Statement will be brought to the attention of the Client - State True or False

Client Horsley Witten Group

Received By UR

Date 7-11-19

Time 1900

How were the samples received? In Cooler T No Cooler \_\_\_\_\_ On Ice T No Ice \_\_\_\_\_  
Direct from Sampling \_\_\_\_\_ Ambient \_\_\_\_\_ Melted Ice \_\_\_\_\_

Were samples within Temperature? 2-6°C T By Gun # 1 Actual Temp -4.7  
By Blank # \_\_\_\_\_ Actual Temp \_\_\_\_\_

Was Custody Seal Intact? NA Were Samples Tampered with? NA

Was COC Relinquished? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all Client T Analysis T Sampler Name F

pertinent Information? Project T ID's T Collection Dates/Times T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F Who was notified? \_\_\_\_\_

Are there Rushes? F Who was notified? \_\_\_\_\_

Are there Short Holds? F Who was notified? \_\_\_\_\_

Is there enough Volume? T

Is there Headspace where applicable? NA MS/MSD? F

Proper Media/Containers Used? T Is splitting samples required? F

Were trip blanks received? F On COC? F

Do all samples have the proper pH? NA Acid \_\_\_\_\_ Base \_\_\_\_\_

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	<u>4</u>	4oz Amb/Clear	
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear	
DI-		Other Glass		Other Plastic		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

#### Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:



*CERTIFICATE OF ANALYSIS*

Josphine Ibanez  
Horsley & Witten  
90 Route 6A  
Sandwich, MA 02563

**RE: Barn On-Call No. 4 (17027)**  
**ESS Laboratory Work Order Number: 19H0197**

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard  
Laboratory Director

**REVIEWED**

**By ESS Laboratory at 4:19 pm, Aug 19, 2019**

**Analytical Summary**

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4

ESS Laboratory Work Order: 19H0197

**SAMPLE RECEIPT**

The following samples were received on August 07, 2019 for the analyses specified on the enclosed Chain of Custody Record.

To achieve CAM compliance for MCP data, ESS Laboratory has reviewed all QA/QC Requirements and Performance Standards listed in each method. Holding times and preservation have also been reviewed. All CAM requirements have been performed and achieved unless noted in the project narrative.

Each method has been set-up in the laboratory to reach required MCP standards. The methods for aqueous VOA and Soil Methanol VOA have known limitations for certain analytes. The regulatory standards may not be achieved due to these limitations. In addition, for all methods, matrix interferences, dilutions, and %Solids may elevate method reporting limits above regulatory standards. ESS Laboratory can provide, upon request, a Limit Checker (regulatory standard comparison spreadsheet) electronic deliverable which will highlight these exceedances.

**Question I: All samples for SVOA were analyzed for a subset of the required MCP list per the client's request.**

Lab Number	Sample Name	Matrix	Analysis
19H0197-01	HW-N	Ground Water	8270D SIM
19H0197-02	HW-A d	Ground Water	8270D SIM
19H0197-03	HW-0	Ground Water	8270D SIM
19H0197-04	HW-1	Ground Water	8270D SIM



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4

ESS Laboratory Work Order: 19H0197

**PROJECT NARRATIVE**

**No unusual observations noted.**

**End of Project Narrative.**

**DATA USABILITY LINKS**

*To ensure you are viewing the most current version of the documents below, please clear your internet cookies for [www.ESSLaboratory.com](http://www.ESSLaboratory.com). Consult your IT Support personnel for information on how to clear your internet cookies.*

[Definitions of Quality Control Parameters](#)

[Semivolatile Organics Internal Standard Information](#)

[Semivolatile Organics Surrogate Information](#)

[Volatile Organics Internal Standard Information](#)

[Volatile Organics Surrogate Information](#)

[EPH and VPH Alkane Lists](#)



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4

ESS Laboratory Work Order: 19H0197

**CURRENT SW-846 METHODOLOGY VERSIONS**

**Analytical Methods**

1010A - Flashpoint  
6010C - ICP  
6020A - ICP MS  
7010 - Graphite Furnace  
7196A - Hexavalent Chromium  
7470A - Aqueous Mercury  
7471B - Solid Mercury  
8011 - EDB/DBCP/TCP  
8015C - GRO/DRO  
8081B - Pesticides  
8082A - PCB  
8100M - TPH  
8151A - Herbicides  
8260B - VOA  
8270D - SVOA  
8270D SIM - SVOA Low Level  
9014 - Cyanide  
9038 - Sulfate  
9040C - Aqueous pH  
9045D - Solid pH (Corrosivity)  
9050A - Specific Conductance  
9056A - Anions (IC)  
9060A - TOC  
9095B - Paint Filter  
MADEP 04-1.1 - EPH  
MADEP 18-2.1 - VPH

**Prep Methods**

3005A - Aqueous ICP Digestion  
3020A - Aqueous Graphite Furnace / ICP MS Digestion  
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion  
3060A - Solid Hexavalent Chromium Digestion  
3510C - Separatory Funnel Extraction  
3520C - Liquid / Liquid Extraction  
3540C - Manual Soxhlet Extraction  
3541 - Automated Soxhlet Extraction  
3546 - Microwave Extraction  
3580A - Waste Dilution  
5030B - Aqueous Purge and Trap  
5030C - Aqueous Purge and Trap  
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.





**CERTIFICATE OF ANALYSIS**

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4

ESS Laboratory Work Order: 19H0197

**MassDEP Analytical Protocol Certification Form**

MADEP RTN: \_\_\_\_\_

This form provides certification for the following data set: **19H0197-01 through 19H0197-04**

Matrices: ☒ Ground Water/Surface Water    ☐ Soil/Sediment    ☐ Drinking Water    ☐ Air    ☐ Other: \_\_\_\_\_

**CAM Protocol** (check all that apply below):

- |                                                           |                                                    |                                                                  |                                                     |                                                                |                                                         |
|-----------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------|
| <input type="checkbox"/> 8260 VOC<br>CAM II A             | <input type="checkbox"/> 7470/7471 Hg<br>CAM III B | <input type="checkbox"/> MassDEP VPH<br>(GC/PID/FID)<br>CAM IV A | <input type="checkbox"/> 8082 PCB<br>CAM V A        | <input type="checkbox"/> 9014 Total<br>Cyanide/PAC<br>CAM VI A | <input type="checkbox"/> 6860 Perchlorate<br>CAM VIII B |
| <input checked="" type="checkbox"/> 8270 SVOC<br>CAM II B | <input type="checkbox"/> 7010 Metals<br>CAM III C  | <input type="checkbox"/> MassDEP VPH<br>(GC/MS)<br>CAM IV C      | <input type="checkbox"/> 8081 Pesticides<br>CAM V B | <input type="checkbox"/> 7196 Hex Cr<br>CAM VI B               | <input type="checkbox"/> MassDEP APH<br>CAM IX A        |
| <input type="checkbox"/> 6010 Metals<br>CAM III A         | <input type="checkbox"/> 6020 Metals<br>CAM III D  | <input type="checkbox"/> MassDEP EPH<br>CAM IV B                 | <input type="checkbox"/> 8151 Herbicides<br>CAM V C | <input type="checkbox"/> Explosives<br>CAM VIII A              | <input type="checkbox"/> TO-15 VOC<br>CAM IX B          |

**Affirmative responses to questions A through F are required for "Presumptive Certainty" status**

- |   |                                                                                                                                                                                                                                                                        |                                                                     |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| A | Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?                                            | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| B | Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?                                                                                                                                                   | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| C | Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?                                                                                   | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| D | Does the laboratory report comply with all the reporting requirements specified in the CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?                                                             | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| E | VPH, EPH, APH and TO-15 only: a. Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).<br>b. APH and TO-15 Methods only: Was the complete analyte list reported for each method? | Yes <input type="checkbox"/> No <input type="checkbox"/>            |
| F | Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?                                                                              | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |

**Responses to Questions G, H and I below are required for "Presumptive Certainty" status**

- |   |                                                                                                                                                                                                                                                                                                                           |                                                                       |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| G | Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocols(s)?<br><b>Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40.1056 (2)(k) and WSC-07-350.</b> | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> * |
| H | Were all QC performance standards specified in the CAM protocol(s) achieved?                                                                                                                                                                                                                                              | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> * |
| I | Were results reported for the complete analyte list specified in the selected CAM protocol(s)?                                                                                                                                                                                                                            | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> * |

**\*All negative responses must be addressed in an attached laboratory narrative.**

**I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.**

Signature: Laurel Stoddard

Printed Name: Laurel Stoddard

Date: August 19, 2019

Position: Laboratory Director



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4  
Client Sample ID: HW-N  
Date Sampled: 08/05/19 14:45  
Percent Solids: N/A  
Initial Volume: 500  
Final Volume: 0.5  
Extraction Method: 3535A

ESS Laboratory Work Order: 19H0197  
ESS Laboratory Sample ID: 19H0197-01  
Sample Matrix: Ground Water  
Units: ug/L  
Analyst: IBM  
Prepared: 8/8/19 17:35

**8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,4-Dioxane	ND (0.250)		8270D SIM		1	08/09/19 18:35	C9H0216	CH90765
<hr/>								
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: 1,4-Dioxane-d8</i>		94 %		15-115				



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4  
Client Sample ID: HW-A d  
Date Sampled: 08/05/19 15:42  
Percent Solids: N/A  
Initial Volume: 500  
Final Volume: 0.5  
Extraction Method: 3535A

ESS Laboratory Work Order: 19H0197  
ESS Laboratory Sample ID: 19H0197-02  
Sample Matrix: Ground Water  
Units: ug/L  
Analyst: IBM  
Prepared: 8/12/19 18:00

**8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,4-Dioxane	ND (0.250)		8270D SIM		1	08/13/19 17:52	C9H0268	CH91258
<hr/>								
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: 1,4-Dioxane-d8</i>		52 %		15-115				



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4  
Client Sample ID: HW-0  
Date Sampled: 08/05/19 16:43  
Percent Solids: N/A  
Initial Volume: 500  
Final Volume: 0.5  
Extraction Method: 3535A

ESS Laboratory Work Order: 19H0197  
ESS Laboratory Sample ID: 19H0197-03  
Sample Matrix: Ground Water  
Units: ug/L  
Analyst: IBM  
Prepared: 8/8/19 17:35

**8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,4-Dioxane	ND (0.250)		8270D SIM		1	08/09/19 19:44	C9H0216	CH90765
<hr/>								
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: 1,4-Dioxane-d8</i>		92 %		15-115				



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4  
Client Sample ID: HW-1  
Date Sampled: 08/05/19 17:18  
Percent Solids: N/A  
Initial Volume: 500  
Final Volume: 0.5  
Extraction Method: 3535A

ESS Laboratory Work Order: 19H0197  
ESS Laboratory Sample ID: 19H0197-04  
Sample Matrix: Ground Water  
Units: ug/L  
Analyst: IBM  
Prepared: 8/8/19 17:35

**8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,4-Dioxane	ND (0.250)		8270D SIM		1	08/09/19 20:18	C9H0216	CH90765
<hr/>								
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: 1,4-Dioxane-d8</i>		99 %		15-115				



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4

ESS Laboratory Work Order: 19H0197

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
---------	--------	-----	-------	-------------	---------------	------	-------------	-----	-----------	-----------

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

**Batch CH90765 - 3535A**

**Blank**

1,4-Dioxane	ND	0.250	ug/L							
Surrogate: 1,4-Dioxane-d8	2.96		ug/L	5.000		59	15-115			

**LCS**

1,4-Dioxane	6.86	0.250	ug/L	10.00		69	40-140			
Surrogate: 1,4-Dioxane-d8	3.65		ug/L	5.000		73	15-115			

**LCS Dup**

1,4-Dioxane	6.34	0.250	ug/L	10.00		63	40-140	8	20	
Surrogate: 1,4-Dioxane-d8	4.11		ug/L	5.000		82	15-115			

**Batch CH91258 - 3535A**

**Blank**

1,4-Dioxane	ND	0.250	ug/L							
Surrogate: 1,4-Dioxane-d8	2.93		ug/L	5.000		59	15-115			

**LCS**

1,4-Dioxane	11.0	0.250	ug/L	10.00		110	40-140			
Surrogate: 1,4-Dioxane-d8	2.85		ug/L	5.000		57	15-115			

**LCS Dup**

1,4-Dioxane	12.2	0.250	ug/L	10.00		122	40-140	11	20	
Surrogate: 1,4-Dioxane-d8	2.69		ug/L	5.000		54	15-115			



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4

ESS Laboratory Work Order: 19H0197

**Notes and Definitions**

U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probably Number
TNTC	Too numerous to Count
CFU	Colony Forming Units



*CERTIFICATE OF ANALYSIS*

Client Name: Horsley & Witten  
Client Project ID: Barn On-Call No. 4

ESS Laboratory Work Order: 19H0197

**ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS**

**ENVIRONMENTAL**

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

[http://www.ct.gov/dph/lib/dph/environmental\\_health/environmental\\_laboratories/pdf/OutOfStateCommercialLaboratories.pdf](http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf)

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml>

Massachusetts Potable and Non Potable Water: M-RI002

<http://public.dep.state.ma.us/Labcert/Labcert.aspx>

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

[http://datamine2.state.nj.us/DEP\\_OPRA/OpraMain/pi\\_main?mode=pi\\_by\\_site&sort\\_order=PI\\_NAMEA&Select+a+Site:=58715](http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715)

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

<http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx>



## ESS Laboratory Sample and Cooler Receipt Checklist

Client: Horsley Witten Group - KPB/HDM  
 Shipped/Delivered Via: ESS Courier

ESS Project ID: 19H0197  
 Date Received: 8/7/2019  
 Project Due Date: 8/14/2019  
 Days for Project: 5 Day

1. Air bill manifest present?   
 Air No.: NA
2. Were custody seals present?
3. Is radiation count <100 CPM?
4. Is a Cooler Present?   
 Temp: 1.4 Iced with: Ice
5. Was COC signed and dated by client?

6. Does COC match bottles?
7. Is COC complete and correct?
8. Were samples received intact?
9. Were labs informed about short holds & rushes?
10. Were any analyses received outside of hold time?

11. Any Subcontracting needed?   
 ESS Sample IDs: \_\_\_\_\_  
 Analysis: \_\_\_\_\_  
 TAT: \_\_\_\_\_

12. Were VOAs received?   
 a. Air bubbles in aqueous VOAs?   
 b. Does methanol cover soil completely?

13. Are the samples properly preserved?   
 a. If metals preserved upon receipt: Date: \_\_\_\_\_ Time: \_\_\_\_\_ By: \_\_\_\_\_  
 b. Low Level VOA vials frozen: Date: \_\_\_\_\_ Time: \_\_\_\_\_ By: \_\_\_\_\_

Sample Receiving Notes:

14. Was there a need to contact Project Manager?   
 a. Was there a need to contact the client?   
 Who was contacted? \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_ By: \_\_\_\_\_

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
01	374542	Yes	NA	Yes	1L Amber - Unpres	NP	
01	374543	Yes	NA	Yes	1L Amber - Unpres	NP	
02	374540	Yes	NA	Yes	1L Amber - Unpres	NP	
02	374541	Yes	NA	Yes	1L Amber - Unpres	NP	
03	374538	Yes	NA	Yes	1L Amber - Unpres	NP	
03	374539	Yes	NA	Yes	1L Amber - Unpres	NP	
04	374536	Yes	NA	Yes	1L Amber - Unpres	NP	
04	374537	Yes	NA	Yes	1L Amber - Unpres	NP	

### 2nd Review

- Were all containers scanned into storage/lab?  
 Are barcode labels on correct containers?  
 Are all Flashpoint stickers attached/container ID # circled?  
 Are all Hex Chrome stickers attached?  
 Are all QC stickers attached?  
 Are VOA stickers attached if bubbles noted?

Initials: [Signature]

Completed By: [Signature] Date & Time: 8/7/19 2245  
 Reviewed By: [Signature] Date & Time: 8/7/19 2249

## ESS Laboratory Sample and Cooler Receipt Checklist

Client: Horsley Witten Group - KPB/HDM ESS Project ID: 19H0197  
Date Received: 8/7/2019  
Delivered By: 224 8/7/19 2249

*Division of Thielsch Engineering, Inc.*  
185 Frances Avenue, Cranston RI 02910  
Tel. (401) 461-7181 Fax (401) 461-4486  
[www.esslaboratory.com](http://www.esslaboratory.com)

Turn Time	STANDARD	Rush
Regulatory State	MA	
Is this project for any of the following?:		
<input type="radio"/> OCT RCP	<input checked="" type="radio"/> MA MCP	<input type="radio"/> ORGP

Reporting Limits	GW-1
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Electronic Deliverables ☒ Limit Checker ☐ Standard Excel ☒ Other (Please Specify →) PDE

Company Name HORSLEY WITTEN GROUP		Project #	Project Name Barn - On Call No 4		jjs 8/8/19
Contact Person JOSEPHINE IBANEZ		Address 90 ROUTE 6A, UNIT 1			
City SANDWICH	State MA	Zip Code 02563	PO #		
Telephone Number 508-833-6600	FAX Number 508-833-3150	Email Address jibanez@horsleywitten.com			

[illegible]

Preservation Code: ☒ 1-Non Preserved ☐ 2-HCl ☐ 3-H<sub>2</sub>SO<sub>4</sub> ☐ 4-HNO<sub>3</sub> ☐ 5-NaOH ☐ 6-Methanol ☐ 7-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> ☐ 8-ZnAc<sub>2</sub>, NaOH ☐ 9-NH<sub>4</sub>Cl ☐ 10-D<sub>2</sub>O ☐ 11-Ascorbic Acid ☐ 12-Other\*

Number of Containers per Sample:

Cooler Temperature: 1.4 °C ± 0.5 °C

run low level sim

Received By: (Signature, Date &amp; Time)

Received By: (Signature, Date &amp; Time)

Division of Thielsch Engineering, Inc.  
185 Frances Avenue, Cranston RI 02910  
Tel. (401) 461-7181 Fax (401) 461-4486  
[www.esslaboratory.com](http://www.esslaboratory.com)

Turn Time	STANDARD	Rush
Regulatory State	MA	
Is this project for any of the following?:		
<input type="radio"/> OCT RCP	<input checked="" type="radio"/> MA MCP	<input type="radio"/> ORGP

ESS Lab # 14H0197

Reporting Limits GW-1

Electronic ☒ Limit Checker ☐ Standard Excel  
Deliverables ☒ Other (Please Specify →) PRE

12	Carl	5	8/7/19	1842	08/19/2037
----	------	---	--------	------	------------

September 4, 2019

Bryan Massa  
Horsley Witten Group  
90 Route 6A Unit #1  
Sandwich, MA 02563

Project Location: Barnstable Airport  
Client Job Number:  
Project Number: 17027  
Laboratory Work Order Number: 19H1141

Enclosed are results of analyses for samples received by the laboratory on August 20, 2019. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "R J McCarthy", is displayed on a light gray rectangular background.

Raymond J. McCarthy  
Project Manager

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39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Horsley Witten Group  
90 Route 6A Unit #1  
Sandwich, MA 02563  
ATTN: Bryan Massa

REPORT DATE: 9/4/2019

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 17027

**ANALYTICAL SUMMARY**

---

WORK ORDER NUMBER: 19H1141

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Barnstable Airport

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
Hose	19H1141-01	Water		SOP 434-PFAAS	
Roof	19H1141-02	Water		SOP 434-PFAAS	
Bumper	19H1141-03	Water		SOP 434-PFAAS	
Officer Side Handline	19H1141-04	Water		SOP 434-PFAAS	
D-Rear	19H1141-05	Water		SOP 434-PFAAS	
O-Rear	19H1141-06	Water		SOP 434-PFAAS	
HW-E	19H1141-07	Ground Water		SOP 434-PFAAS	
DL 11 0-1	19H1141-08	Soil		SM 2540G SOP-465 PFAS	

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#### **CASE NARRATIVE SUMMARY**

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

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**SOP 434-PFAAS****Qualifications:****L-01**

Laboratory fortified blank /laboratory control sample recovery outside of control limits. Data validation is not affected since all results are "not detected" for all samples in this batch for this compound and bias is on the high side.

**Analyte & Samples(s) Qualified:****N-EtFOSAA**

B238697-BS1

**S-01**

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

**Analyte & Samples(s) Qualified:****13C-PFDA**

19H1141-01RE1[Hose], 19H1141-01RE2[Hose], 19H1141-02RE1[Roof], 19H1141-03RE1[Bumper], 19H1141-04RE1[Officer Side Handline], 19H1141-05RE1[D-Rear], 19H1141-06RE1[O-Rear]

**13C-PFHxA**

19H1141-01RE1[Hose], 19H1141-01RE2[Hose], 19H1141-02RE1[Roof], 19H1141-03RE1[Bumper], 19H1141-04RE1[Officer Side Handline], 19H1141-05RE1[D-Rear], 19H1141-06RE1[O-Rear]

**d5-NEtFOSAA**

19H1141-01RE1[Hose], 19H1141-01RE2[Hose], 19H1141-02RE1[Roof], 19H1141-03RE1[Bumper], 19H1141-04RE1[Officer Side Handline], 19H1141-05RE1[D-Rear], 19H1141-06RE1[O-Rear]

**S-03**

Surrogate recovery outside of control limits due to suspected sample matrix interference.

**Analyte & Samples(s) Qualified:****13C-PFHxA**

19H1141-06[O-Rear]

**Z-01**

Surrogate outside of conformance. Sample not re-extracted due to holding time.

**Analyte & Samples(s) Qualified:****13C-PFDA**

19H1141-01[Hose]

**13C-PFHxA**

19H1141-01[Hose]

**SOP-465 PFAS****Qualifications:****MS-07**

Matrix spike recovery is outside of control limits. Analysis is in control based on laboratory fortified blank recovery. Possibility of sample matrix effects that lead to low bias for reported result or non-homogeneous sample aliquot cannot be eliminated.

**Analyte & Samples(s) Qualified:****6:2 Fluorotelomersulfonate (6:2 FT)**

B238616-MS1

**8:2 Fluorotelomersulfonate (8:2 FT)**

B238616-MSD1

**Perfluorodecanoic acid (PFDA)**

B238616-MS1

**MS-07A**

Matrix spike and spike duplicate recovery is outside of control limits. Analysis is in control based on laboratory fortified blank recovery. Possibility of matrix effects that lead to low bias or non-homogeneous sample aliquot cannot be eliminated.

**Analyte & Samples(s) Qualified:****Perfluorododecanoic acid (PFDoA)**

B238616-MS1, B238616-MSD1

**Perfluoroheptanoic acid (PFHpA)**

B238616-MS1, B238616-MSD1

---

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---

**MS-11**

Matrix spike recovery outside of control limits. Possibility of sample matrix effects that lead to a high bias for reported result or non-homogeneous sample aliquots cannot be eliminated.

**Analyte & Samples(s) Qualified:****6:2 Fluorotelomersulfonate (6:2 FT)**

B238616-MSD1

**8:2 Fluorotelomersulfonate (8:2 FT)**B238616-MS1

---

**MS-12**

Matrix spike recovery and matrix spike duplicate recovery outside of control limits. Possibility of sample matrix effects that lead to a high bias for reported result or non-homogeneous sample aliquots cannot be eliminated.

**Analyte & Samples(s) Qualified:****Perfluorohexanesulfonic acid (PFH)**B238616-MS1, B238616-MSD1

---

**MS-22**

Either matrix spike or MS duplicate is outside of control limits, but the other is within limits. RPD between the two MS/MSD results is within method specified criteria.

**Analyte & Samples(s) Qualified:****Perfluoropentanoic acid (PFPeA)**B238616-MS1

---

**MS-23**

Either matrix spike or MS duplicate is outside of control limits, but the other is within limits. RPD between the two MS/MSD results is outside of the method specified criteria. Reduced precision anticipated for any reported result for this compound.

**Analyte & Samples(s) Qualified:****Perfluorotetradecanoic acid (PFTA)**

B238616-MS1, B238616-MSD1

**Perfluorotridecanoic acid (PFTrDA)**B238616-MS1, B238616-MSD1

---

**R-06**

Matrix spike duplicate RPD is outside of control limits. Reduced precision is anticipated for reported result for this compound in this sample.

**Analyte & Samples(s) Qualified:****N-EtFOSAA**

B238616-MSD1

**N-MeFOSAA**

B238616-MSD1

**Perfluorobutanesulfonic acid (PFB)**

B238616-MSD1

**Perfluorooctanesulfonamide (FOS/**

B238616-MSD1

**EPA 537**

If more than the compound list from method EPA 537 has been reported, prep and analysis has been conducted by method SOP 434-PFAAS.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.

I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.



Lisa A. Worthington  
Technical Representative

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19H1141

Date Received: 8/20/2019

Field Sample #: Hose

Sampled: 8/19/2019 09:20

Sample ID: 19H1141-01

Sample Matrix: Water

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	39	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Perfluoropentanoic acid (PFPeA)	130	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Perfluorohexanoic acid (PFHxA)	550	40	ng/L	20		SOP 434-PFAAS	8/22/19	8/30/19 23:30	BLM
Perfluorohexanesulfonic acid (PFHxS)	5.9	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Perfluoroheptanoic acid (PFHpA)	73	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Perfluorooctanoic acid (PFOA)	88	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Perfluorooctanesulfonic acid (PFOS)	9.0	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
6:2 Fluorotelomersulfonate (6:2 FTS A)	4500	100	ng/L	50		SOP 434-PFAAS	8/22/19	9/3/19 17:46	BLM
Perfluorononanoic acid (PFNA)	11	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Perfluorodecanoic acid (PFDA)	14	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
N-EtFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
8:2 Fluorotelomersulfonate (8:2 FTS A)	270	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
8:2 Fluorotelomersulfonate (8:2 FTS A)	540	40	ng/L	20		SOP 434-PFAAS	8/22/19	8/30/19 23:30	BLM
Perfluoroundecanoic acid (PFUnA)	5.6	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Perfluorododecanoic acid (PFDoA)	6.2	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:18	BLM
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
13C-PFHxA	151	*	70-130		Z-01		8/30/19	23:18	
13C-PFHxA		*	70-130		S-01		8/30/19	23:30	
13C-PFHxA		*	70-130		S-01		9/3/19	17:46	
13C-PFDA	48.2	*	70-130		Z-01		8/30/19	23:18	
13C-PFDA		*	70-130		S-01		8/30/19	23:30	
13C-PFDA		*	70-130		S-01		9/3/19	17:46	
d5-NEtFOSAA	101		70-130				8/30/19	23:18	
d5-NEtFOSAA		*	70-130		S-01		8/30/19	23:30	
d5-NEtFOSAA		*	70-130		S-01		9/3/19	17:46	

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19H1141

Date Received: 8/20/2019

Field Sample #: Roof

Sampled: 8/19/2019 09:23

Sample ID: 19H1141-02

Sample Matrix: Water

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	3.4	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluoropentanoic acid (PFPeA)	9.2	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluorohexanoic acid (PFHxA)	47	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluorohexanesulfonic acid (PFHxS)	3.3	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluoroheptanoic acid (PFHpA)	4.5	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluorooctanoic acid (PFOA)	8.7	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluorooctanesulfonic acid (PFOS)	6.8	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
6:2 Fluorotelomersulfonate (6:2 FTS A)	680	20	ng/L	10		SOP 434-PFAAS	8/22/19	8/30/19 23:55	BLM
Perfluorononanoic acid (PFNA)	2.6	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluorodecanoic acid (PFDA)	4.0	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
N-EtFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
8:2 Fluorotelomersulfonate (8:2 FTS A)	150	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:43	BLM
Surrogates	% Recovery	Recovery Limits	Flag/Qual						
13C-PFHxA	103	70-130			8/30/19 23:43				
<b>13C-PFHxA</b>	*	70-130	S-01		8/30/19 23:55				
13C-PFDA	93.5	70-130			8/30/19 23:43				
<b>13C-PFDA</b>	*	70-130	S-01		8/30/19 23:55				
d5-NEtFOSAA	83.6	70-130			8/30/19 23:43				
<b>d5-NEtFOSAA</b>	*	70-130	S-01		8/30/19 23:55				



39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19H1141

Date Received: 8/20/2019

Field Sample #: Bumper

Sampled: 8/19/2019 09:38

Sample ID: 19H1141-03

Sample Matrix: Water

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	2.9	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluoropentanoic acid (PFPeA)	9.4	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluorohexanoic acid (PFHxA)	48	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluorohexanesulfonic acid (PFHxS)	3.9	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluoroheptanoic acid (PFHpA)	3.9	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluorooctanoic acid (PFOA)	10	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluorooctanesulfonic acid (PFOS)	6.0	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
6:2 Fluorotelomersulfonate (6:2 FTS A)	540	20	ng/L	10		SOP 434-PFAAS	8/22/19	8/31/19 0:33	BLM
Perfluorononanoic acid (PFNA)	3.1	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluorodecanoic acid (PFDA)	4.5	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
N-EtFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
8:2 Fluorotelomersulfonate (8:2 FTS A)	150	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:21	BLM
Surrogates	% Recovery	Recovery Limits			Flag/Qual				
13C-PFHxA	99.2	70-130						8/31/19 0:21	
<b>13C-PFHxA</b>	*	70-130			S-01			8/31/19 0:33	
13C-PFDA	91.0	70-130						8/31/19 0:21	
<b>13C-PFDA</b>	*	70-130			S-01			8/31/19 0:33	
d5-NEtFOSAA	96.2	70-130						8/31/19 0:21	
<b>d5-NEtFOSAA</b>	*	70-130			S-01			8/31/19 0:33	

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19H1141

Date Received: 8/20/2019

Field Sample #: Officer Side Handline

Sampled: 8/19/2019 09:43

Sample ID: 19H1141-04

Sample Matrix: Water

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	15	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Perfluoropentanoic acid (PFPeA)	49	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Perfluorohexanoic acid (PFHxA)	290	40	ng/L	20		SOP 434-PFAAS	8/22/19	8/31/19 0:59	BLM
Perfluorohexanesulfonic acid (PFHxS)	4.0	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Perfluoroheptanoic acid (PFHpA)	27	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Perfluorooctanoic acid (PFOA)	39	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Perfluorooctanesulfonic acid (PFOS)	8.7	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
6:2 Fluorotelomersulfonate (6:2 FTS A)	2800	40	ng/L	20		SOP 434-PFAAS	8/22/19	8/31/19 0:59	BLM
Perfluorononanoic acid (PFNA)	13	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Perfluorodecanoic acid (PFDA)	32	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
N-EtFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
8:2 Fluorotelomersulfonate (8:2 FTS A)	820	40	ng/L	20		SOP 434-PFAAS	8/22/19	8/31/19 0:59	BLM
Perfluoroundecanoic acid (PFUnA)	9.1	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Perfluorododecanoic acid (PFDoA)	3.0	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 0:46	BLM
Surrogates	% Recovery	Recovery Limits			Flag/Qual				
13C-PFHxA	119	70-130						8/31/19 0:46	
<b>13C-PFHxA</b>	*	70-130			S-01			8/31/19 0:59	
13C-PFDA	97.4	70-130						8/31/19 0:46	
<b>13C-PFDA</b>	*	70-130			S-01			8/31/19 0:59	
d5-NEtFOSAA	89.6	70-130						8/31/19 0:46	
<b>d5-NEtFOSAA</b>	*	70-130			S-01			8/31/19 0:59	

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19H1141

Date Received: 8/20/2019

Field Sample #: D-Rear

Sampled: 8/19/2019 09:47

Sample ID: 19H1141-05

Sample Matrix: Water

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	3.7	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluoropentanoic acid (PFPeA)	12	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluorohexanoic acid (PFHxA)	66	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluorohexanesulfonic acid (PFHxS)	4.8	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluoroheptanoic acid (PFHpA)	5.5	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluorooctanoic acid (PFOA)	11	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluorooctanesulfonic acid (PFOS)	9.3	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
6:2 Fluorotelomersulfonate (6:2 FTS A)	570	20	ng/L	10		SOP 434-PFAAS	8/22/19	8/31/19 1:24	BLM
Perfluorononanoic acid (PFNA)	3.0	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluorodecanoic acid (PFDA)	4.9	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
N-EtFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
8:2 Fluorotelomersulfonate (8:2 FTS A)	140	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:11	BLM
Surrogates	% Recovery	Recovery Limits	Flag/Qual						
<b>13C-PFHxA</b>	*	70-130	S-01		8/31/19 1:24				
13C-PFHxA	110	70-130			8/31/19 1:11				
<b>13C-PFDA</b>	*	70-130	S-01		8/31/19 1:24				
13C-PFDA	102	70-130			8/31/19 1:11				
<b>d5-NEtFOSAA</b>	*	70-130	S-01		8/31/19 1:24				
d5-NEtFOSAA	85.3	70-130			8/31/19 1:11				

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19H1141

Date Received: 8/20/2019

Field Sample #: O-Rear

Sampled: 8/19/2019 09:51

Sample ID: 19H1141-06

Sample Matrix: Water

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	30	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Perfluoropentanoic acid (PFPeA)	100	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Perfluorohexanoic acid (PFHxA)	400	40	ng/L	20		SOP 434-PFAAS	8/22/19	8/31/19 1:49	BLM
Perfluorohexanesulfonic acid (PFHxS)	4.3	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Perfluoroheptanoic acid (PFHpA)	81	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Perfluorooctanoic acid (PFOA)	76	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Perfluorooctanesulfonic acid (PFOS)	8.6	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
6:2 Fluorotelomersulfonate (6:2 FTS A)	4000	100	ng/L	50		SOP 434-PFAAS	8/22/19	9/3/19 17:58	BLM
Perfluorononanoic acid (PFNA)	16	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Perfluorodecanoic acid (PFDA)	32	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
N-EtFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
8:2 Fluorotelomersulfonate (8:2 FTS A)	710	40	ng/L	20		SOP 434-PFAAS	8/22/19	8/31/19 1:49	BLM
Perfluoroundecanoic acid (PFUnA)	5.5	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Perfluorododecanoic acid (PFDoA)	4.6	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Perfluorotetradecanoic acid (PFTA)	2.1	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/31/19 1:36	BLM
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
13C-PFHxA	139	*	70-130		S-03		8/31/19	1:36	
13C-PFHxA		*	70-130		S-01		8/31/19	1:49	
13C-PFHxA		*	70-130				9/3/19	17:58	
13C-PFDA	123		70-130				8/31/19	1:36	
13C-PFDA		*	70-130		S-01		8/31/19	1:49	
13C-PFDA		*	70-130				9/3/19	17:58	
d5-NEtFOSAA	70.5		70-130				8/31/19	1:36	
d5-NEtFOSAA		*	70-130		S-01		8/31/19	1:49	
d5-NEtFOSAA		*	70-130				9/3/19	17:58	

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19H1141

Date Received: 8/20/2019

Field Sample #: HW-E

Sampled: 8/19/2019 10:36

Sample ID: 19H1141-07

Sample Matrix: Ground Water

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	6.9	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluoropentanoic acid (PFPeA)	28	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluorohexanoic acid (PFHxA)	24	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluorohexanesulfonic acid (PFHxS)	2.1	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluoroheptanoic acid (PFHpA)	5.3	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluorooctanoic acid (PFOA)	4.7	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
6:2 Fluorotelomersulfonate (6:2 FTS A)	69	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
N-EtFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
8:2 Fluorotelomersulfonate (8:2 FTS A)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
N-MeFOSAA	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L	1		SOP 434-PFAAS	8/22/19	8/30/19 23:05	BLM
Surrogates	% Recovery	Recovery Limits	Flag/Qual						
13C-PFHxA	122	70-130							
13C-PFDA	107	70-130							
d5-NEtFOSAA	77.4	70-130							

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19H1141

Date Received: 8/20/2019

Field Sample #: DL 11 0-1

Sampled: 8/19/2019 10:09

Sample ID: 19H1141-08

Sample Matrix: Soil

## Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	1.3	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluorobutanesulfonic acid (PFBS)	ND	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluoropentanoic acid (PFPeA)	3.6	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluorohexanoic acid (PFHxA)	3.6	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluorohexanesulfonic acid (PFHxS)	ND	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluoroheptanoic acid (PFHpA)	1.8	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluorooctanoic acid (PFOA)	5.2	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluorooctanesulfonic acid (PFOS)	1.5	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluorooctanesulfonamide (FOSA)	ND	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
6:2 Fluorotelomersulfonate (6:2 FTS A)	30	1.1	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluorononanoic acid (PFNA)	2.4	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluorodecanoic acid (PFDA)	8.7	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
N-EtFOSAA	ND	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
8:2 Fluorotelomersulfonate (8:2 FTS A)	25	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluoroundecanoic acid (PFUnA)	4.3	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
N-MeFOSAA	ND	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluorododecanoic acid (PFDoA)	1.8	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluorotridecanoic acid (PFTrDA)	2.3	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Perfluorotetradecanoic acid (PFTA)	ND	0.90	µg/kg dry	1		SOP-465 PFAS	8/26/19	8/29/19 17:19	BLM
Surrogates	% Recovery	Recovery Limits	Flag/Qual						
13C-PFHxA	99.9	70-130							
13C-PFDA	100	70-130							
d5-NEtFOSAA	111	70-130							

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 19H1141

Date Received: 8/20/2019

Field Sample #: DL 11 0-1

Sampled: 8/19/2019 10:09

Sample ID: 19H1141-08

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	96.4		% Wt	1		SM 2540G	9/3/19	9/3/19 21:50	AVF



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**Sample Extraction Data****Prep Method: % Solids-SM 2540G**

Lab Number [Field ID]	Batch	Date
19H1141-08 [DL 11 0-1]	B239606	09/03/19

**Prep Method: SOP 434-PFAAS-SOP 434-PFAAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
19H1141-01 [Hose]	B238697	250	1.00	08/22/19
19H1141-01RE1 [Hose]	B238697	250	1.00	08/22/19
19H1141-01RE2 [Hose]	B238697	250	1.00	08/22/19
19H1141-02 [Roof]	B238697	250	1.00	08/22/19
19H1141-02RE1 [Roof]	B238697	250	1.00	08/22/19
19H1141-03 [Bumper]	B238697	250	1.00	08/22/19
19H1141-03RE1 [Bumper]	B238697	250	1.00	08/22/19
19H1141-04 [Officer Side Handline]	B238697	250	1.00	08/22/19
19H1141-04RE1 [Officer Side Handline]	B238697	250	1.00	08/22/19
19H1141-05 [D-Rear]	B238697	250	1.00	08/22/19
19H1141-05RE1 [D-Rear]	B238697	250	1.00	08/22/19
19H1141-06 [O-Rear]	B238697	250	1.00	08/22/19
19H1141-06RE1 [O-Rear]	B238697	250	1.00	08/22/19
19H1141-06RE2 [O-Rear]	B238697	250	1.00	08/22/19
19H1141-07 [HW-E]	B238697	250	1.00	08/22/19

**Prep Method: SOP 465-PFAAS-SOP-465 PFAS**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
19H1141-08 [DL 11 0-1]	B238616	5.73	10.0	08/26/19

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## QUALITY CONTROL

## Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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## Batch B238616 - SOP 465-PFAAS

## Blank (B238616-BLK1)

Prepared: 08/26/19 Analyzed: 08/29/19

Perfluorobutanoic acid (PFBA)	ND	0.89	µg/kg wet							
Perfluorobutanesulfonic acid (PFBS)	ND	0.89	µg/kg wet							
Perfluoropentanoic acid (PFPeA)	ND	0.89	µg/kg wet							
Perfluorohexanoic acid (PFHxA)	ND	0.89	µg/kg wet							
Perfluorohexanesulfonic acid (PFHxS)	ND	0.89	µg/kg wet							
Perfluoroheptanoic acid (PFHpA)	ND	0.89	µg/kg wet							
Perfluoroheptanesulfonic acid (PFHpS)	ND	0.89	µg/kg wet							
Perfluorooctanoic acid (PFOA)	ND	0.89	µg/kg wet							
Perfluorooctanesulfonic acid (PFOS)	ND	0.89	µg/kg wet							
Perfluorooctanesulfonamide (FOSA)	ND	0.89	µg/kg wet							
6:2 Fluorotelomersulfonate (6:2 FTS A)	ND	1.1	µg/kg wet							
Perfluorononanoic acid (PFNA)	ND	0.89	µg/kg wet							
Perfluorodecanoic acid (PFDA)	ND	0.89	µg/kg wet							
Perfluorodecanesulfonic acid (PFDS)	ND	0.89	µg/kg wet							
N-EtFOSAA	ND	0.89	µg/kg wet							
8:2 Fluorotelomersulfonate (8:2 FTS A)	ND	0.89	µg/kg wet							
Perfluoroundecanoic acid (PFUnA)	ND	0.89	µg/kg wet							
N-MeFOSAA	ND	0.89	µg/kg wet							
Perfluorododecanoic acid (PFDoA)	ND	0.89	µg/kg wet							
Perfluorotridecanoic acid (PFTTrDA)	ND	0.89	µg/kg wet							
Perfluorotetradecanoic acid (PFTA)	ND	0.89	µg/kg wet							
Surrogate: 13C-PFHxA	22.8		µg/kg wet	17.7		129	70-130			
Surrogate: 13C-PFDA	22.1		µg/kg wet	17.7		125	70-130			
Surrogate: d5-NEtFOSAA	81.3		µg/kg wet	70.8		115	70-130			

## LCS (B238616-BS1)

Prepared: 08/26/19 Analyzed: 08/29/19

Perfluorobutanoic acid (PFBA)	1.00	0.88	µg/kg wet	0.881		114	50-150			
Perfluorobutanesulfonic acid (PFBS)	0.960	0.88	µg/kg wet	0.779		123	50-150			
Perfluoropentanoic acid (PFPeA)	0.925	0.88	µg/kg wet	0.881		105	50-150			
Perfluorohexanoic acid (PFHxA)	0.837	0.88	µg/kg wet	0.881		95.0	50-150			
Perfluorohexanesulfonic acid (PFHxS)	0.794	0.88	µg/kg wet	0.801		99.1	50-150			
Perfluoroheptanoic acid (PFHpA)	0.856	0.88	µg/kg wet	0.881		97.2	50-150			
Perfluoroheptanesulfonic acid (PFHpS)	0.670	0.88	µg/kg wet	0.837		80.1	50-150			
Perfluorooctanoic acid (PFOA)	0.998	0.88	µg/kg wet	0.881		113	50-150			
Perfluorooctanesulfonic acid (PFOS)	0.733	0.88	µg/kg wet	0.815		89.9	50-150			
Perfluorooctanesulfonamide (FOSA)	0.866	0.88	µg/kg wet	0.881		98.3	50-150			
6:2 Fluorotelomersulfonate (6:2 FTS A)	0.844	1.1	µg/kg wet	0.837		101	50-150			
Perfluorononanoic acid (PFNA)	0.661	0.88	µg/kg wet	0.881		75.1	50-150			
Perfluorodecanoic acid (PFDA)	0.672	0.88	µg/kg wet	0.881		76.3	50-150			
Perfluorodecanesulfonic acid (PFDS)	1.04	0.88	µg/kg wet	0.850		123	50-150			
N-EtFOSAA	0.909	0.88	µg/kg wet	0.881		103	50-150			
8:2 Fluorotelomersulfonate (8:2 FTS A)	1.25	0.88	µg/kg wet	0.845		148	50-150			
Perfluoroundecanoic acid (PFUnA)	0.969	0.88	µg/kg wet	0.881		110	50-150			
N-MeFOSAA	1.02	0.88	µg/kg wet	0.881		116	50-150			
Perfluorododecanoic acid (PFDoA)	0.822	0.88	µg/kg wet	0.881		93.4	50-150			
Perfluorotridecanoic acid (PFTTrDA)	0.624	0.88	µg/kg wet	0.881		70.9	50-150			
Perfluorotetradecanoic acid (PFTA)	0.761	0.88	µg/kg wet	0.881		86.4	50-150			
Surrogate: 13C-PFHxA	20.3		µg/kg wet	17.6		116	70-130			
Surrogate: 13C-PFDA	19.4		µg/kg wet	17.6		110	70-130			
Surrogate: d5-NEtFOSAA	75.1		µg/kg wet	70.5		107	70-130			

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## QUALITY CONTROL

## Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B238616 - SOP 465-PFAAS</b>										
<b>Matrix Spike (B238616-MS1)</b>	<b>Source: 19H1141-08</b>			Prepared: 08/26/19 Analyzed: 08/29/19						
Perfluorobutanoic acid (PFBA)	1.97	0.90	µg/kg dry	0.898	1.27	78.4	50-150			
Perfluorobutanesulfonic acid (PFBS)	0.755	0.90	µg/kg dry	0.795	ND	95.0	50-150			
<b>Perfluoropentanoic acid (PFPeA)</b>	5.21	0.90	µg/kg dry	0.898	3.63	<b>176</b>	* 50-150			MS-22
Perfluorohexanoic acid (PFHxA)	4.74	0.90	µg/kg dry	0.898	3.57	129	50-150			
<b>Perfluorohexanesulfonic acid (PFHxS)</b>	1.29	0.90	µg/kg dry	0.817	ND	<b>158</b>	* 50-150			MS-12
<b>Perfluoroheptanoic acid (PFHpA)</b>	2.20	0.90	µg/kg dry	0.898	1.79	<b>46.1</b>	* 50-150			MS-07A
Perfluoroheptanesulfonic acid (PFHpS)	0.891	0.90	µg/kg dry	0.853	ND	104	50-150			
Perfluorooctanoic acid (PFOA)	6.00	0.90	µg/kg dry	0.898	5.22	87.2	50-150			
Perfluorooctanesulfonic acid (PFOS)	2.54	0.90	µg/kg dry	0.830	1.54	121	50-150			
Perfluorooctanesulfonamide (FOSA)	1.13	0.90	µg/kg dry	0.898	ND	126	50-150			
<b>6:2 Fluorotelomersulfonate (6:2 FTS A)</b>	26.1	1.1	µg/kg dry	0.853	30.4	<b>-496</b>	* 50-150			MS-07
Perfluorononanoic acid (PFNA)	3.46	0.90	µg/kg dry	0.898	2.39	119	50-150			
<b>Perfluorodecanoic acid (PFDA)</b>	8.28	0.90	µg/kg dry	0.898	8.74	<b>-51.8</b>	* 50-150			MS-07
Perfluorodecanesulfonic acid (PFDS)	0.832	0.90	µg/kg dry	0.866	ND	96.0	50-150			
N-EtFOSAA	0.475	0.90	µg/kg dry	0.898	ND	52.9	50-150			
<b>8:2 Fluorotelomersulfonate (8:2 FTS A)</b>	27.6	0.90	µg/kg dry	0.862	25.0	<b>304</b>	* 50-150			MS-11
Perfluoroundecanoic acid (PFUnA)	5.52	0.90	µg/kg dry	0.898	4.27	140	50-150			
N-MeFOSAA	0.529	0.90	µg/kg dry	0.898	ND	58.9	50-150			
<b>Perfluorododecanoic acid (PFDoA)</b>	1.97	0.90	µg/kg dry	0.898	1.85	<b>13.2</b>	* 50-150			MS-07A
<b>Perfluorotridecanoic acid (PFTTrDA)</b>	1.89	0.90	µg/kg dry	0.898	2.31	<b>-46.0</b>	* 50-150			MS-23
<b>Perfluorotetradecanoic acid (PFTA)</b>	0.551	0.90	µg/kg dry	0.898	0.364	<b>20.8</b>	* 50-150			MS-23
Surrogate: 13C-PFHxA	18.6		µg/kg dry	18.0		103	70-130			
Surrogate: 13C-PFDA	17.7		µg/kg dry	18.0		98.6	70-130			
Surrogate: d5-NEtFOSAA	73.5		µg/kg dry	71.8		102	70-130			
<b>Matrix Spike Dup (B238616-MSD1)</b>	<b>Source: 19H1141-08</b>			Prepared: 08/26/19 Analyzed: 08/29/19						
Perfluorobutanoic acid (PFBA)	1.84	0.90	µg/kg dry	0.904	1.27	62.9	50-150	7.09	30	
Perfluorobutanesulfonic acid (PFBS)	0.526	0.90	µg/kg dry	0.800	ND	65.7	50-150	<b>35.8</b>	* 30	R-06
Perfluoropentanoic acid (PFPeA)	4.32	0.90	µg/kg dry	0.904	3.63	75.9	50-150	18.7	30	
Perfluorohexanoic acid (PFHxA)	4.21	0.90	µg/kg dry	0.904	3.57	70.3	50-150	11.8	30	
<b>Perfluorohexanesulfonic acid (PFHxS)</b>	1.36	0.90	µg/kg dry	0.823	ND	<b>166</b>	* 50-150	5.71	30	MS-12
<b>Perfluoroheptanoic acid (PFHpA)</b>	2.11	0.90	µg/kg dry	0.904	1.79	<b>35.4</b>	* 50-150	4.37	30	MS-07A
Perfluoroheptanesulfonic acid (PFHpS)	1.17	0.90	µg/kg dry	0.859	ND	137	50-150	27.3	30	
Perfluorooctanoic acid (PFOA)	6.04	0.90	µg/kg dry	0.904	5.22	91.2	50-150	0.698	30	
Perfluorooctanesulfonic acid (PFOS)	2.46	0.90	µg/kg dry	0.836	1.54	109	50-150	3.45	30	
Perfluorooctanesulfonamide (FOSA)	0.819	0.90	µg/kg dry	0.904	ND	90.6	50-150	<b>32.1</b>	* 30	R-06
<b>6:2 Fluorotelomersulfonate (6:2 FTS A)</b>	32.8	1.1	µg/kg dry	0.859	30.4	<b>283</b>	* 50-150	22.6	30	MS-11
Perfluorononanoic acid (PFNA)	3.33	0.90	µg/kg dry	0.904	2.39	104	50-150	3.71	30	
Perfluorodecanoic acid (PFDA)	9.61	0.90	µg/kg dry	0.904	8.74	96.1	50-150	14.9	30	
Perfluorodecanesulfonic acid (PFDS)	1.12	0.90	µg/kg dry	0.872	ND	128	50-150	29.5	30	
N-EtFOSAA	1.20	0.90	µg/kg dry	0.904	ND	133	50-150	<b>86.8</b>	* 30	R-06
<b>8:2 Fluorotelomersulfonate (8:2 FTS A)</b>	24.1	0.90	µg/kg dry	0.868	25.0	<b>-105</b>	* 50-150	13.7	30	MS-07
Perfluoroundecanoic acid (PFUnA)	5.30	0.90	µg/kg dry	0.904	4.27	114	50-150	4.11	30	
N-MeFOSAA	0.816	0.90	µg/kg dry	0.904	ND	90.3	50-150	<b>42.8</b>	* 30	R-06
<b>Perfluorododecanoic acid (PFDoA)</b>	2.26	0.90	µg/kg dry	0.904	1.85	<b>46.0</b>	* 50-150	14.0	30	MS-07A
Perfluorotridecanoic acid (PFTTrDA)	3.38	0.90	µg/kg dry	0.904	2.31	119	50-150	<b>56.3</b>	* 30	MS-23
Perfluorotetradecanoic acid (PFTA)	1.00	0.90	µg/kg dry	0.904	0.364	70.6	50-150	<b>58.1</b>	* 30	MS-23
Surrogate: 13C-PFHxA	18.6		µg/kg dry	18.1		103	70-130			
Surrogate: 13C-PFDA	17.6		µg/kg dry	18.1		97.2	70-130			
Surrogate: d5-NEtFOSAA	79.0		µg/kg dry	72.3		109	70-130			

39 Spruce Street \* East Longmeadow, MA 01028 \* FAX 413/525-6405 \* TEL. 413/525-2332

## QUALITY CONTROL

## Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B238697 - SOP 434-PFAAS</b>										
<b>Blank (B238697-BLK1)</b>										
Prepared: 08/22/19 Analyzed: 08/30/19										
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L							
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L							
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L							
6:2 Fluorotelomersulfonate (6:2 FTS A)	ND	2.0	ng/L							
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L							
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L							
N-EtFOSAA	ND	2.0	ng/L							
8:2 Fluorotelomersulfonate (8:2 FTS A)	ND	2.0	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L							
N-MeFOSAA	ND	2.0	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L							
Surrogate: 13C-PFHxA	47.8		ng/L	40.0		119	70-130			
Surrogate: 13C-PFDA	46.7		ng/L	40.0		117	70-130			
Surrogate: d5-NEtFOSAA	164		ng/L	160		103	70-130			
<b>LCS (B238697-BS1)</b>										
Prepared: 08/22/19 Analyzed: 08/30/19										
Perfluorobutanoic acid (PFBA)	1.84	2.0	ng/L	2.00		92.1	50-150			
Perfluorobutanesulfonic acid (PFBS)	1.24	2.0	ng/L	1.77		70.2	50-150			
Perfluoropentanoic acid (PFPeA)	1.23	2.0	ng/L	2.00		61.4	50-150			
Perfluorohexanoic acid (PFHxA)	1.86	2.0	ng/L	2.00		92.9	50-150			
Perfluorohexanesulfonic acid (PFHxS)	2.65	2.0	ng/L	1.82		146	50-150			
Perfluoroheptanoic acid (PFHpA)	1.68	2.0	ng/L	2.00		84.1	50-150			
Perfluoroheptanesulfonic acid (PFHpS)	2.33	2.0	ng/L	1.90		123	50-150			
Perfluorooctanoic acid (PFOA)	2.12	2.0	ng/L	2.00		106	50-150			
Perfluorooctanesulfonic acid (PFOS)	2.50	2.0	ng/L	1.85		135	50-150			
Perfluorooctanesulfonamide (FOSA)	2.18	2.0	ng/L	2.00		109	50-150			
6:2 Fluorotelomersulfonate (6:2 FTS A)	1.96	2.0	ng/L	1.90		103	50-150			
Perfluorononanoic acid (PFNA)	1.64	2.0	ng/L	2.00		81.9	50-150			
Perfluorodecanoic acid (PFDA)	2.35	2.0	ng/L	2.00		118	50-150			
Perfluorodecanesulfonic acid (PFDS)	1.89	2.0	ng/L	1.93		98.0	50-150			
N-EtFOSAA	3.99	2.0	ng/L	2.00		199	50-150	*		L-01
8:2 Fluorotelomersulfonate (8:2 FTS A)	2.51	2.0	ng/L	1.92		131	50-150			
Perfluoroundecanoic acid (PFUnA)	2.06	2.0	ng/L	2.00		103	50-150			
N-MeFOSAA	1.75	2.0	ng/L	2.00		87.7	50-150			
Perfluorododecanoic acid (PFDoA)	1.46	2.0	ng/L	2.00		72.8	50-150			
Perfluorotridecanoic acid (PFTrDA)	1.92	2.0	ng/L	2.00		95.9	50-150			
Perfluorotetradecanoic acid (PFTA)	1.75	2.0	ng/L	2.00		87.6	50-150			
Surrogate: 13C-PFHxA	38.3		ng/L	40.0		95.8	70-130			
Surrogate: 13C-PFDA	41.0		ng/L	40.0		103	70-130			
Surrogate: d5-NEtFOSAA	159		ng/L	160		99.3	70-130			

# FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
L-01	Laboratory fortified blank /laboratory control sample recovery outside of control limits. Data validation is not affected since all results are "not detected" for all samples in this batch for this compound and bias is on the high side.
MS-07	Matrix spike recovery is outside of control limits. Analysis is in control based on laboratory fortified blank recovery. Possibility of sample matrix effects that lead to low bias for reported result or non-homogeneous sample aliquot cannot be eliminated.
MS-07A	Matrix spike and spike duplicate recovery is outside of control limits. Analysis is in control based on laboratory fortified blank recovery. Possibility of matrix effects that lead to low bias or non-homogeneous sample aliquot cannot be eliminated.
MS-11	Matrix spike recovery outside of control limits. Possibility of sample matrix effects that lead to a high bias for reported result or non-homogeneous sample aliquots cannot be eliminated.
MS-12	Matrix spike recovery and matrix spike duplicate recovery outside of control limits. Possibility of sample matrix effects that lead to a high bias for reported result or non-homogeneous sample aliquots cannot be eliminated.
MS-22	Either matrix spike or MS duplicate is outside of control limits, but the other is within limits. RPD between the two MS/MSD results is within method specified criteria.
MS-23	Either matrix spike or MS duplicate is outside of control limits, but the other is within limits. RPD between the two MS/MSD results is outside of the method specified criteria. Reduced precision anticipated for any reported result for this compound.
R-06	Matrix spike duplicate RPD is outside of control limits. Reduced precision is anticipated for reported result for this compound in this sample.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.
S-03	Surrogate recovery outside of control limits due to suspected sample matrix interference.
Z-01	Surrogate outside of conformance. Sample not re-extracted due to holding time.

**CERTIFICATIONS**
**Certified Analyses included in this Report**

Analyte	Certifications
<b><i>EPA 537 in Drinking Water</i></b>	
Perfluorobutanoic acid (PFBA)	NH
Perfluorobutanesulfonic acid (PFBS)	NH,ME,RI,NJ,CT,PA
Perfluorohexanoic acid (PFHxA)	NH,ME,RI,NJ,CT,PA
Perfluorohexanesulfonic acid (PFHxS)	NH,ME,RI,NJ,CT,PA
Perfluoroheptanoic acid (PFHpA)	NH,ME,RI,NJ,CT,PA
Perfluorooctanoic acid (PFOA)	NH,NY,ME,RI,NJ,CT,PA
Perfluorooctanesulfonic acid (PFOS)	NH,NY,ME,RI,NJ,CT,PA
Perfluorononanoic acid (PFNA)	NH,ME,RI,NJ,CT,PA
Perfluorodecanoic acid (PFDA)	NH,ME,RI,NJ,CT,PA
N-EtFOSAA	NH,RI,NJ,CT,PA
Perfluoroundecanoic acid (PFUnA)	NH,ME,RI,NJ,CT,PA
N-MeFOSAA	NH,RI,NJ,CT,PA
Perfluorododecanoic acid (PFDoA)	NH,ME,RI,NJ,CT,PA
Perfluorotridecanoic acid (PFTrDA)	NH,ME,RI,NJ,CT,PA
Perfluorotetradecanoic acid (PFTA)	ME,RI,NJ,CT,PA
<b><i>SOP 434-PFAAS in Water</i></b>	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
6:2 Fluorotelomersulfonate (6:2 FTS A)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-EtFOSAA	NH-P
8:2 Fluorotelomersulfonate (8:2 FTS A)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-MeFOSAA	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P
<b><i>SOP-465 PFAS in Soil</i></b>	
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-EtFOSAA	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-MeFOSAA	NH-P

# CERTIFICATIONS

## Certified Analyses included in this Report

Analyte	Certifications
<b>SOP-465 PFAS in Soil</b>	
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P

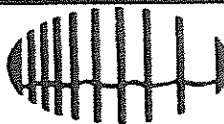
The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	03/1/2020
MA	Massachusetts DEP	M-MA100	06/30/2020
CT	Connecticut Department of Public Health	PH-0567	09/30/2019
NY	New York State Department of Health	10899 NELAP	04/1/2020
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2020
RI	Rhode Island Department of Health	LAO00112	12/30/2019
NC	North Carolina Div. of Water Quality	652	12/31/2019
NJ	New Jersey DEP	MA007 NELAP	06/30/2020
FL	Florida Department of Health	E871027 NELAP	06/30/2020
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2020
ME	State of Maine	2011028	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2019
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2020
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2020
NC-DW	North Carolina Department of Health	25703	07/31/2020
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2020





I Have Not Confirmed Sample Container  
Numbers With Lab Staff Before Relinquishing  
Over Samples \_\_\_\_\_



**con-test®**  
ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

**Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False  
Statement will be brought to the attention of the Client - State True or False**

Client HWC  
 Received By CF Date 8/20/2019 Time 1830  
 How were the samples received? In Cooler T No Cooler \_\_\_\_\_ On Ice T No Ice \_\_\_\_\_  
 Direct from Sampling \_\_\_\_\_ Ambient \_\_\_\_\_ Melted Ice \_\_\_\_\_  
 Were samples within Temperature? 2-6°C T By Gun # 1 Actual Temp - 5.7  
 By Blank # \_\_\_\_\_ Actual Temp - \_\_\_\_\_  
 Was Custody Seal Intact? N/A Were Samples Tampered with? N/A  
 Was COC Relinquished? T Does Chain Agree With Samples? T  
 Are there broken/leaking/loose caps on any samples? F  
 Is COC in ink/ Legible? T Were samples received within holding time? T  
 Did COC include all Client T Analysis T Sampler Name T  
 pertinent Information? Project T ID's T Collection Dates/Times T  
 Are Sample labels filled out and legible? T  
 Are there Lab to Filters? F Who was notified? \_\_\_\_\_  
 Are there Rushes? F Who was notified? \_\_\_\_\_  
 Are there Short Holds? F Who was notified? \_\_\_\_\_  
 Is there enough Volume? T  
 Is there Headspace where applicable? N/A MS/MSD? F  
 Proper Media/Containers Used? T Is splitting samples required? F  
 Were trip blanks received? F On COC? F  
 Do all samples have the proper pH? N/A Acid \_\_\_\_\_ Base \_\_\_\_\_

Vials	#	Containers:	#	#	#	#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear
Meoh-		250 mL Amb.		250 mL Plastic	<u>16</u>	4oz Amb/Clear
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear
DI-		Other Glass		Other Plastic		Encore
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:
Sulfuric-		Perchlorate		Ziplock		

**Unused Media**

Vials	#	Containers:	#	#	#	#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear
DI-		Other Plastic		Other Glass		Encore
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:
Sulfuric-		Perchlorate		Ziplock		

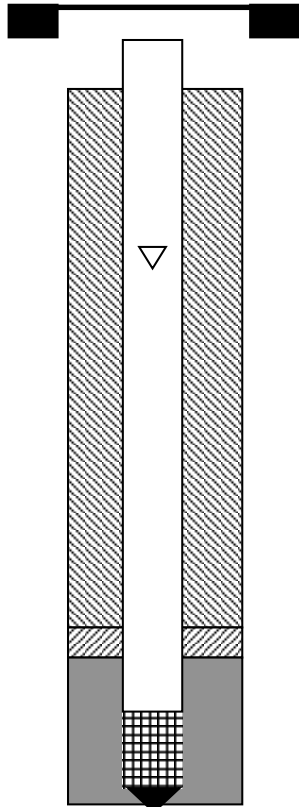
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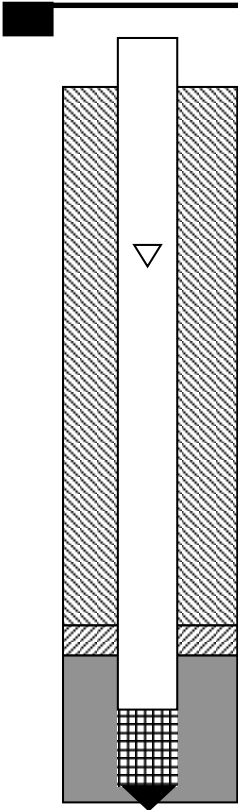
## APPENDIX B

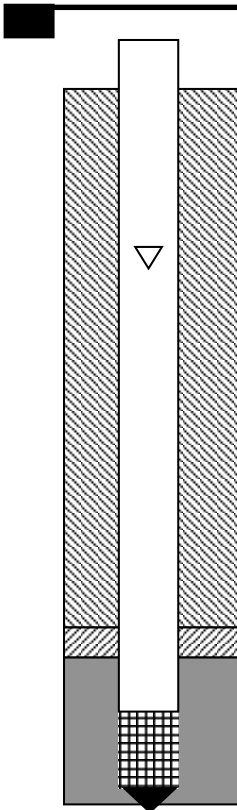
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### Soil Boring and Monitoring Well Instalation Logs

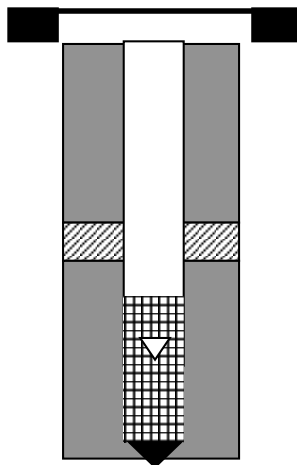








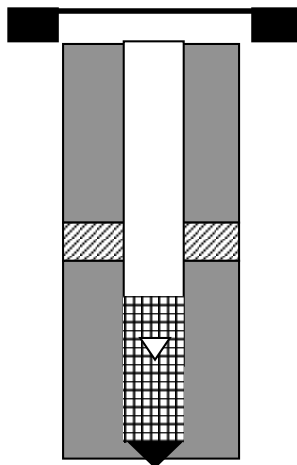
Cape Cod Test Boring 5 Rayber Road, Orleans, MA 02653 (508) 240-1000 div. Desmond Well Drilling, Inc.			Project Horsley Witten Group Barnstable, 480 Barnstable Road Hyannis, MA			Boring No. HW-D (dd)				
						Sheet 1 of 1				
Driller: Tommy Desmond Helper: Sean Morgan Inspector: Josephine Ibanez			Boring location: Cluster by solar field (41.67230, -70.27519) Ground Surface Elevation: Date start: 5/14/2019			Date end: 5/14/2019				
Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches			Notes:			Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x59.4' SCH40 PVC FJT Screen Size: 2"x5'X.010 SCH40 PVC FJT				
Depth	Sample			Sample Description			Well Installation			
(FT)	NO	PEN/REC	DEPTH/FT							
2							<p>Not to scale Well Depth: 64.9' Static: 19.95' Well screen: 59.9' to 64.9' Grout: 3' to 55' Bentonite seal: 55' to 57' Sand pack: 57' to 64.9' End of boring: 67' End of sample: 69'</p>			
0										
-2										
-4										
-6										
-8										
-10										
-12										
-14										
-16										
-18										
-20										
-22										
-24										
-26										
-28	1	24/16	27 - 29					F-M-C brown sand; little gravel. Wet.		
-30										
-32	2	24/24	32 -34					F-M-C light brown sand; trace gravel. Wet.		
-34										
-36										
-38	3	24/0	37 - 39					No recovery.		
-40										
-42	4	24/20	42 - 44					F-M-C light gray sand; trace gravel. Wet.		
-44										
-46										
-48	5	24/21	47 - 49					F-M-C light gray sand; little clay. Wet.		
-50										
-52	6	24/8	52 - 54					F-M-C dark brown silty sand; some clay. Wet.		
[?]										
-57	7	24/17	57 - 59					F-M-C light brown sand; trace gravel. Wet.		
-62	8	24/13	62 - 64					F-M-C light brown sand. Wet.		
-67	9	24/13	67 - 69					F-M-C red/brown sand and clay. Wet.		
-72										

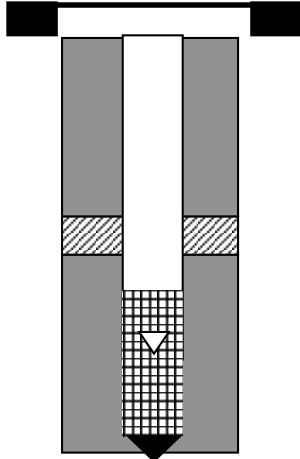






Cape Cod Test Boring 5 Rayber Road, Orleans, MA 02653 (508) 240-1000 div. Desmond Well Drilling, Inc.			Project Horsley Witten Group Barnstable, 480 Barnstable Road Hyannis, MA			Boring No. HW-D (d)	
						Sheet 1 of 1	
Driller: Tommy Desmond			Helper: Sean Morgan			Boring location: Cluster by solar field (41.67230, -70.27519)	
Inspector: Josephine Ibanez						Ground Surface Elevation:	
						Date start: 5/15/2019 Date end: 5/15/2019	
Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches			Notes:			Auger Size: 6 1/4" x 4" H.S.A	
						Casing Size: 2"x39.75' SCH40 PVC FJT	
						Screen Size: 2"x5'X.010 SCH40 PVC FJT	
Depth	Sample			Sample Description			Well Installation
(FT)	NO	PEN/REC	DEPTH/FT				
2				F-M-C brown sand and gravel. Dry.			
0			0 - 15				
-2							
-4							
-6							
-8							
-10							
-12							
-14							
-16			15 - 45				
-18							
-20							
-22							
-24							
-26							
-28							
-30							
-32							
-34							
-36							
-38							
-40							
-42							
-44							
-46							
-48							
-50							
-52							
[?]							
-57							
-62							
-67							
-72							
Granular Soils		Cohesive Soils		Proportions Used		Well Installation Key	
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY			■ - CONCRETE	
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%		■ - SAND PACK	
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%		■ - GROUT	
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%		■ - BENTONITE	
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%		■ - SCREEN	
> 50	V. DENSE	15 - 30	V. STIFF			▽ - APPROX. WATER LEVEL	
		> 30	HARD				
CAPE COD TEST BORING						BORING NO. HW-D (d)	

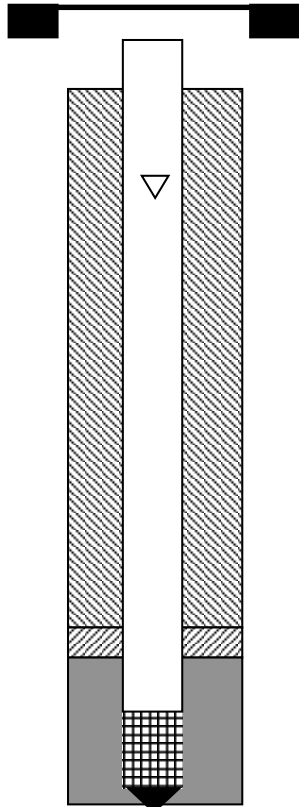
Cape Cod Test Boring 5 Rayber Road, Orleans, MA 02653 (508) 240-1000 div. Desmond Well Drilling, Inc.			Project Horsley Witten Group Barnstable, 480 Barnstable Road Hyannis, MA			Boring No. HW-I (d)	
						Sheet 1 of 1	
Driller: Tommy Desmond			Boring location: Behind deployment (41.66662, -70.27212)				
Helper: Sean Morgan			Ground Surface Elevation:				
Inspector: Josephine Ibanez			Date start: 5/16/2019			Date end: 5/16/2019	
Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches			Notes:			Auger Size: 6 1/4" x 4" H.S.A	
						Casing Size: 2"x36.5' SCH40 PVC FJT	
						Screen Size: 2"x5'X.010 SCH40 PVC FJT	
Depth	Sample			Sample Description			Well Installation
(FT)	NO	PEN/REC	DEPTH/FT				
2				F-M-C light brown sand; trace gravel. Wet.			
0							
-2							
-4							
-6							
-8							
-10							
-12							
-14							
-16							
-18							
-20							
-22							
-24							
-26							
-28	1	24/20	27 - 29				
-30							
-32	2	24/24	32 -34				
-34							
-36							
-38	3	24/11	37 - 39				
-40							
-42	4	24/15	42 - 44				
-44							
-46							
-48							
-50							
-52							
[?]							
-57							
-62							
-67							
-72							
</							



Cape Cod Test Boring 5 Rayber Road, Orleans, MA 02653 (508) 240-1000 div. Desmond Well Drilling, Inc.		Project Horsley Witten Group Barnstable, 480 Barnstable Road Hyannis, MA		Boring No. HW-M		
				Sheet 1 of 1		
Driller: Tommy Desmond		Boring location: Cit Ave and Plant Road (41.67157, -70.29359)				
Helper: Sean Morgan		Ground Surface Elevation:				
Inspector: Josephine Ibanez		Date start: 5/30/2019		Date end: 5/30/2019		
Direct push sampler consists of 4' x 2 3/8" G3 dual tube direct push steel tooling with 4' x 1 1/2" PVC liner with 201 ft lb hydraulic hammer (percussion rate 2200 bpm)				Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x16.9' SCH40 PVC FJT Screen Size: 2"x10'X.010 SCH40 PVC FJT		
Depth	Sample				Sample Description	Well Installation
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"		
2					Vacuum truck.	
0			0 - 5			
-2						
-4	1		5 - 8		F-M-C brown sand and gravel.	
-6					Dry.	
-8	2		8 - 12		F-M-C brown sand and gravel.	
-10					Dry.	
-12	3		12 - 16		F-M-C brown sand and gravel.	
-14					Dry.	
-16	4		16 - 20		F-M-C brown sand and gravel.	
-18					Dry.	
-20	5		20 - 24		F-M-C brown sand and gravel.	
-22					Wet.	
-24	6		24 - 28		F-M-C brown sand and gravel.	
-26					Wet.	
-28						
-30						
-32						
-34						
-36						
-38						
-40						
-42						
-44						
-46						
-48						
-50						
-52						
-54						
-56						
-58						
-60						
-62						
-64						
-66						
Granular Soils		Cohesive Soils		Proportions Used	Well Installation Key	
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY			
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%	 - CONCRETE	
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%	 - SAND PACK	
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%	 - SOIL BACKFILL	
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%	 - BENTONITE	
> 50	V. DENSE	15 - 30	V. STIFF		 - SCREEN	
		> 30	HARD		 - APPROX. WATER LEVEL	
CAPE COD TEST BORING				BORING NO. HW-M		

Cape Cod Test Boring 5 Rayber Road, Orleans, MA 02653 (508) 240-1000 div. Desmond Well Drilling, Inc.		Project Horsley Witten Group Barnstable, 480 Barnstable Road Hyannis, MA		Boring No. HW-N		
				Sheet 1 of 1		
Driller: Tommy Desmond		Boring location: Attucks Lane (41.67372, -70.29490)				
Helper: Sean Morgan		Ground Surface Elevation:				
Inspector: Josephine Ibanez		Date start: 5/31/2019		Date end: 5/31/2019		
Direct push sampler consists of 4' x 2 3/8" G3 dual tube direct push steel tooling with 4' x 1 1/2" PVC liner with 201 ft lb hydraulic hammer (percussion rate 2200 bpm)				Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x16.9' SCH40 PVC FJT Screen Size: 2"x10'X.010 SCH40 PVC FJT		
Depth	Sample				Sample Description	Well Installation
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"		
2					Vacuum truck.	
0			0 - 5			
-2						
-4	1		5 - 8		F-M-C brown sand and gravel.	
-6					Dry.	
-8	2		8 - 12		F-M-C brown sand and gravel.	
-10					Dry.	
-12	3		12 - 16		F-M-C brown sand and gravel.	
-14					Wet.	
-16	4		16 - 20		F-M-C brown sand and gravel.	
-18					Wet.	
-20	5		20 - 24		F-M-C brown sand and gravel.	
-22					Wet.	
-24						
-26						
-28						
-30						
-32						
-34						
-36						
-38						
-40						
-42						
-44						
-46						
-48						
-50						
-52						
-54						
-56						
-58						
-60						
-62						
-64						
-66						
Granular Soils		Cohesive Soils		Proportions Used		Well Installation Key ■ - CONCRETE ■ - SAND PACK Z - SOIL BACKFILL ▨ - BENTONITE ▩ - SCREEN ▽ - APPROX. WATER LEVEL
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY			
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%		
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%		
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%		
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%		
> 50	V. DENSE	15 - 30	V. STIFF			
				> 30	HARD	
CAPE COD TEST BORING				BORING NO. HW-N		

Cape Cod Test Boring 5 Rayber Road, Orleans, MA 02653 (508) 240-1000 div. Desmond Well Drilling, Inc.		Project Horsley Witten Group Barnstable, 480 Barnstable Road Hyannis, MA		Boring No. HW-O		
				Sheet 1 of 1		
Driller: Tommy Desmond		Boring location: Airport Road (41.67054, -70.29819)				
Helper: Sean Morgan		Ground Surface Elevation:				
Inspector: Josephine Ibanez		Date start: 5/31/2019		Date end: 5/31/2019		
Direct push sampler consists of 4' x 2 3/8" G3 dual tube direct push steel tooling with 4' x 1 1/2" PVC liner with 201 ft lb hydraulic hammer (percussion rate 2200 bpm)				Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x16.9' SCH40 PVC FJT Screen Size: 2"x10'X.010 SCH40 PVC FJT		
Depth	Sample				Sample Description	Well Installation
(FT)	NO	PEN/REC	DEPTH/FT	BLOWS 6"		
2					Vacuum truck.	
0			0 - 5			
-2						
-4	1		5 - 8		F-M-C brown sand and gravel.	
-6					Wet.	
-8	2		8 - 12		F-M-C brown sand and gravel.	
-10					Wet.	
-12	3		12 - 16		F-M-C brown sand and gravel.	
-14					Wet.	
-16	4		16 - 20		F-M-C brown sand and gravel.	
-18					Wet.	
-20						
-22						
-24						
-26						
-28						
-30						
-32						
-34						
-36						
-38						
-40						
-42						
-44						
-46						
-48						
-50						
-52						
-54						
-56						
-58						
-60						
-62						
-64						
-66						
Granular Soils		Cohesive Soils		Proportions Used	Well Installation Key	
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY			
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%	 - CONCRETE	
4 - 10	LOOSE	2 - 4	SOFT	Little 10 - 20%	 - SAND PACK	
10 - 30	M. DENSE	4 - 8	M. STIFF	Some 20 - 35%	 - SOIL BACKFILL	
30 - 50	DENSE	8 - 15	STIFF	And 35 - 50%	 - BENTONITE	
> 50	V. DENSE	15 - 30	V. STIFF		 - SCREEN	
		> 30	HARD		 - APPROX. WATER LEVEL	
CAPE COD TEST BORING				BORING NO. HW-O		

Cape Cod Test Boring 5 Rayber Road, Orleans, MA 02653 (508) 240-1000 div. Desmond Well Drilling, Inc.			Project Horsley Witten Group Barnstable, 480 Barnstable Road Hyannis, MA			Boring No. HW-K		
						Sheet 1 of 1		
Driller: Tommy Desmond Helper: Sean Morgan Inspector: Josephine Ibanez			Boring location: Back of parking lot off site (41.66284, -70.27542) Ground Surface Elevation: Date start: 5/31/2019			Date end: 6/3/2019		
Sampler consists of a two inch split spoon driven using a 140 lb. hammer falling thirty inches			Notes:			Auger Size: 6 1/4" x 4" H.S.A Casing Size: 2"x39' SCH40 PVC FJT Screen Size: 2"x5'X.010 SCH40 PVC FJT		
Depth	Sample			Sample Description			Well Installation	
(FT)	NO	PEN/REC	DEPTH/FT					
2				F-M-C brown sand; some gravel; some cobble. Dry.				
0								
-2								
-4								
-6	1	24/24	5 - 7	F-M-C brown sand; trace cobble; trace gravel. Dry.				
-8	2	24/10	7 - 9					
-10								
-12	3	24/15	12 - 14	F-M-C light brown sand; trace gravel. Dry.				
-14								
-16								
-18	4	24/15	17 - 19	F-M brown sand; trace silt. Wet at 22 ft.				
-20								
-22	5	24/15	22 - 24	F-M brown silty sand. Wet.				
-24								
-26								
-28	6	24/8	27 - 29	F-M-C brown sand; trace silt. Wet.				
-30								
-32	7	24/9	32 -34	F-M-C brown silty sand; trace gravel. Wet.				
-34								
-36								
-38	8	24/9	37 - 39	F-M-C brown sand; M-C brown/black sand. Wet.				
-40								
-42	9	24/12	42 - 44					
-44								
-46								
-48								
-50								
-52								
[?]								
-57								
-62								
-67								
-72								
Granular Soils		Cohesive Soils		Proportions Used		Well Installation Key		
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY					
0 - 4	V. LOOSE	> 2	V. SOFT	Trace 0 - 10%		■ - CONCRETE		
4 - 10	LOOSE	2 - 4	SOFT					
10 - 30	M. DENSE	4 - 8	M. STIFF	Little 10 - 20%		■ - SAND PACK		
30 - 50	DENSE	8 - 15	STIFF					
> 50	V. DENSE	15 - 30	V. STIFF	Some 20 - 35%		▨ - GROUT		
		> 30	HARD					
CAPE COD TEST BORING				BORING NO.		HW-K		

Not to scale  
 Well Depth: 44'  
 Static: 19.7'  
 Well screen: 39' to 44'  
 Grout: 3' to 34'  
 Bentonite seal: 34' to 36'  
 Sand pack: 36' to 44'  
 End of boring: 44'  
 End of sample: 44'

Well Installation Key  
 ■ - CONCRETE  
 ■ - SAND PACK  
 ▨ - GROUT  
 ▨ - BENTONITE  
 ▨ - SCREEN  
 ▽ - APPROX. WATER LEVEL